GARDNER ON CARLOS CASTANEDA • THE AUDREY SANTO CASE • *THE HONEY BEE*

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Volume 23, No. 5 • **September/October 1999**

Where Do We Come From?

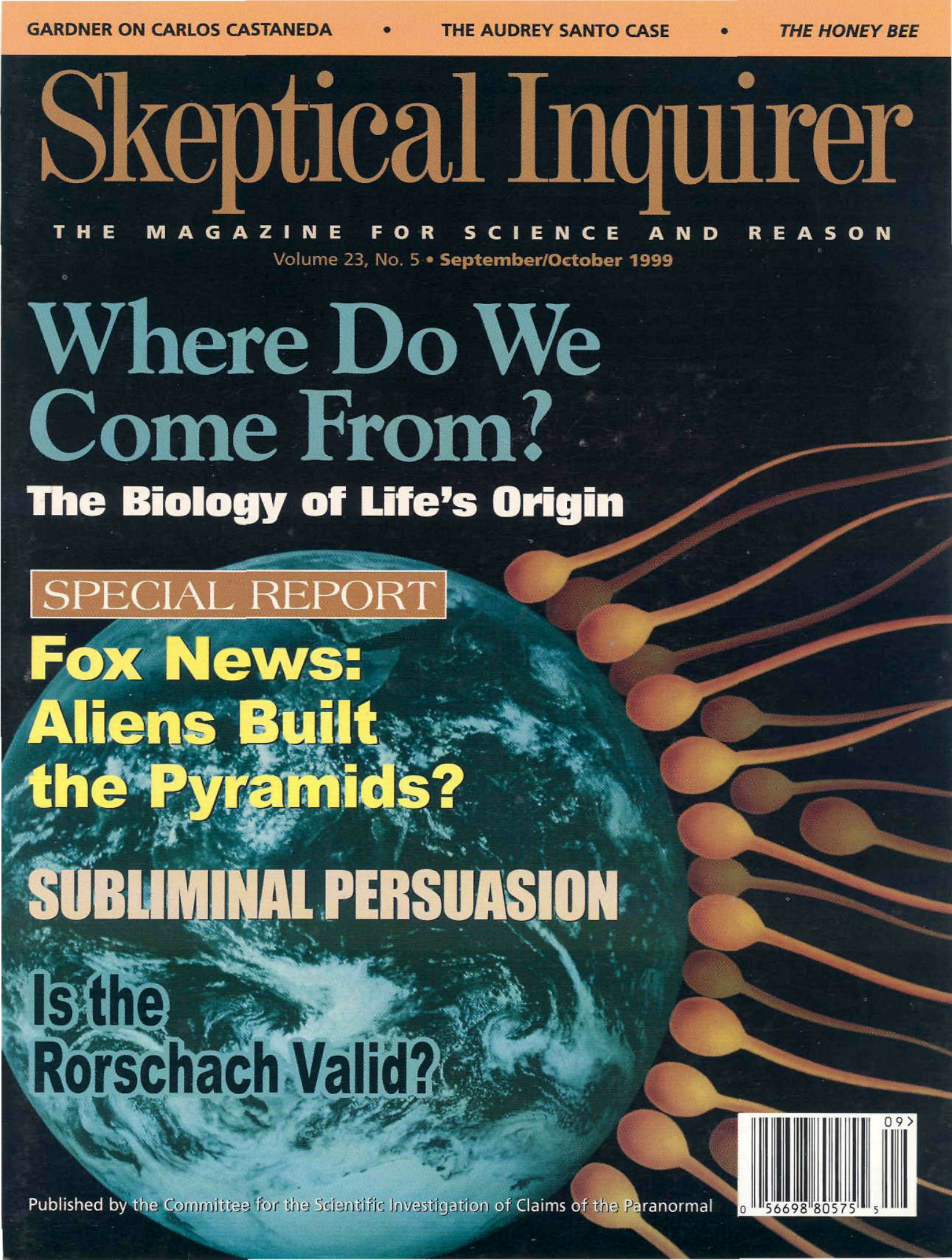
The Biology of Life's Origin

SPECIAL REPORT

Fox News: Aliens Built the Pyramids?

SUBLIMINAL PERSUASION

Is the Rorschach Valid?



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EDITOR'S NOTE

The Biology of Life's Origin

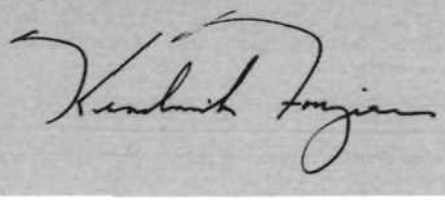
The origin of life is one of the outstanding scientific questions of our time. One problem facing scientists trying to explain how life began is that so far we have only one example: life on Earth. In this issue's cover article, Massimo Pigliucci, an assistant professor in the Departments of Botany and of Ecology and Evolutionary Biology at the University of Tennessee, provides a humbling overview of what we know—and what we don't know—about the biology of life's origin. Creationists constantly conflate the question of the origin of life—which is a still-unresolved fundamental question—with the subsequent evolution of life—about which, of course, we know a great deal. Despite all the philosophical ramifications, the origin of life is a *scientific* question, and Pigliucci puts the topic into up-to-date scientific context as he roams over the various theories and latest evidence. He also provides a series of top ten references to the topic. There are many different possible routes by which an ancestral nucleoprotein might have become the first living organism, but we don't know which one was used. And there's nothing wrong with saying we don't yet know. As Pigliucci concludes, "The origin of life is one question that science will be pondering for some time to come, and skeptics should be wary of oversimplified answers found in introductory biology textbooks."

* * *

We had a pleasant visit with our longtime colleague and friend James Randi recently. He was a distinguished guest lecturer at Los Alamos National Laboratory, and my wife Ruth and I drove the two hours north from Albuquerque to hear his talk. (Ruth is such an admirer of Randi she keeps threatening to run off with him, but fortunately for me that hasn't happened yet.) Randi has spoken twice in previous years at Sandia National Labs in Albuquerque, where I spend my days and where I helped host him; this time it was Los Alamos's turn. His nearly two-hour lecture to a packed audience of 500 was deservedly well received. Speaking to a greater concentration of physicists than you'll find anywhere outside a meeting of the American Physical Society (which itself gave an award to Randi a few years back), he straightforwardly repeats his frequent message that physicists, with their logical minds, are among the easiest to deceive with psychic-like magician's trickery. No one seems to mind the gentle admonition because the physicists know he is only warning against arrogance and self-deception. And Randi leaves no doubt that he loves science, understands the scientific process thoroughly, and eternally defends all good science. It's bad science, and pseudoscience, he goes after, still quite effectively, thank you. After his talk Randi kindly invited us to join him at an informal book signing and impromptu demonstration of magic tricks at the Bradbury Museum. He wowed the onlookers as usual.

* * *

The reaction to our special issue on Science & Religion: Conflict or Conciliation? (July/August 1999) has been voluminous and so far overwhelmingly positive. Many of the letters are quite thoughtful. They are continuing to arrive, in numbers far beyond what we can publish, but we will present a selection of them in a future issue, probably November/December.



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Society for Scientific Exploration Tilts Wildly at Paradigms

DAVE THOMAS

The Society for Scientific Exploration (SSE), publisher of the *Journal of Scientific Exploration*, held its eighteenth annual meeting June 3–5 in Albuquerque, New Mexico, and it was a wild ride.

John Mack

The sessions were organized into four major topics: shaking pillars of the paradigm, cold fusion, anomalous phenomena, and suppression of new science. Almost every type of "paranormal" or "anomalous" phenomena imaginable was discussed, and one outlandish claim after another was apparently accepted uncritically by most of the attendees.

The meeting began with attacks on relativity and evolution. Other speakers enthusiastically promoted cold fusion, spoon bending, "creation" of trinkets, the healing effects of prayer, alien abductions, the face on Mars, and the measurement of bacterial contamination at distances of thousands of miles.

The SSE is the same organization that last year got international publicity for a supposedly "independent" and credulous report it issued on UFOs that was based on testimony only from UFOlogists and believers (SI, September/October 1998). One telling measure of how different this science group is from the mainstream involves the deliberate rephrasing of scientific or skeptical aphorisms. For example, the Discovery Institute's Jonathan Wells, who spoke on why biology would benefit from consideration of "Intelligent Design," declared his desire to replace Theodosius Dobzhansky's famous statement "Nothing in biology makes sense except in light of evolution" with the revised version "Nothing in biology makes sense except in light of *evidence*." Wells also stated that the benefits of introducing "design" to biology would include avoidance of "wasted efforts, that is, looking for [natural] causes where none are to be found."

Former astronaut Brian O'Leary, who maintains that "The fat lady hasn't sung yet" regarding the proposed artificiality of the "Face on Mars," declared that the phrase "Extraordinary claims require extraordinary evidence" would be better stated as "Extraordinary claims require extraordinary *investigation*." O'Leary also urged attendees to explore "outside the box" into such areas as UFO studies, planetary anomalies, healing psychokinesis, consciousness, new energy, reincarnation, mediumship, and more.

The cold fusion talks were among the best of the conference. Many of the speakers (Ed Storms of Los Alamos National Lab, George Miley of the University of Illinois, Melvin Miles of the China Lake naval center, and Michael McKubre of SRI International) claimed to have replicable measurements of tritium or other table-top nuclear products, and of excess (purportedly fusion-caused) heat. These speakers presented serious measurements, and many frankly discussed difficulties with their research. In some ways, it was like traveling back in time to late 1989: no one knows exactly why the phenomenon happens, it produces many fewer neutrons than "conventional" fusion, repeatability is very difficult (sometimes the anomalous effects are observed for one bar of palladium, but not for another from the very same batch), and so on. But at least the presenters acknowledged the need for replicability and evidence.

Not so for Lee Pulos of the University of British Columbia, who discussed his trips to Brazil to study the "extraordinary" powers of one Thomaz Green Morton. Morton supposedly received his psychokinetic powers at the young age of twelve, when he was struck by lightning. He performs spoon-bending, "transmutation" of metals, and other impossible feats. One example cited was the direct transformation of a U.S. silver dollar into a larger Pisces medallion made of a different metal! But Pulos didn't think these were simply magic tricks, because he personally observed Morton bending spoons without touching them. If the "powers" of Thomaz Green Morton are real, modern science is totally wrong about the forces of nature (such as electromagnetism). Or, perhaps, Morton is simply a magician out to fool the gullible public.

David Jacobs

After the talk, I asked Pulos why he hadn't rushed Thomaz Morton over to Florida to take James Randi's $1 million challenge. After all, *if his powers are real*, I said, it would be like taking candy from a baby. But Pulos dismissed this suggestion, replying that Morton wasn't interested in investigations like that.

Larry Dossey discussed effects of prayer on cardiac patients, and mentioned that almost half of U.S. medical universities were looking into the phenomenon in one way or another. Like it or not, he said, "Prayer is back in medicine." Paul Marmet of the University of Ottawa presented his "Simple Theory of the Perihelion of Mercury," which is based on Newtonian mechanics, and not relativity (except for the convenient mass-energy equivalence part). Marmet demonstrated his principle with a spring and various weights—as the mass was increased, the period got longer, just as he claims happens in the advance of Mercury's perihelion. But a handout paper, available at www.newtonphysics.on.ca, showed that Marmet's entire development is based on assumption of circularity of Mercury's orbit. For example, Marmet states repeatedly that "The kinetic energy of an orbiting mass is always half of the [magnitude of the] potential energy," a fact which holds only for *circular* orbits. But Mercury has the most eccentric orbit (e=0.2056) of all the solar planets except Pluto, a fact which demolishes Marmet's derivation, and which should not have escaped any peer reviewer.

David Jacobs of Temple University talked about alien abductions, as did John Mack of Harvard's Cambridge Hospital the next day. Both Jacobs and Mack agree on the reality of the abduction phenomenon, based mainly on the recollections of thousands of hypnotized "abductees." But Jacobs considers the aliens to have malicious designs for hybridization and colonization, while Mack perceives the aliens as "emissaries of the divine" that profoundly touch the humans they contact, and who probably are more concerned with the fate of Earth than with the fate of humanity.

Jacques Benveniste presented his research on the "Role of Water in the Transmission of the Molecular Signal." Benveniste claims that chemical reactions in cells are not mediated by physical lock-and-key receptor mechanisms, but instead by *electromagnetic signals* received

Jacques Benveniste

by the receptors. He believes that a simple voice recording of white noise of this "signal" can be transmitted via water molecules, even at fantastically diluted homeopathic solutions. Indeed, he thinks that the signal can be transmitted over the Internet or by radio waves, enabling remote detection of chemical effects caused by, say, bacteria. Benveniste admitted to having no idea why this phenomenon occurs, and suggested that it was the job of the physicists to determine how the "molecular signal" actually produces long-term changes in water molecules.

Many of the conference speakers complained about suppression of research into anomalies by mainstream scientists and skeptics. But they misrepresented the mission of organizations like CSICOP when they claimed that skeptics want to suppress the very discussion of such ideas, or even the existence of organizations like the SSE. I suspect that most skeptics would instead champion the SSE's quest to perform investigations of paranormal phenomena. We just wish that they would be more skeptical and self-critical. Although a very few attendees strongly questioned some of the claims presented, most seemed content to not rock the boat, lest their own boat be rocked in return. Invited speaker William Tifft, an astronomer from the University of Arizona who has published several papers in serious journals regarding his radical hypothesis of quantization of global redshifts, told the attendees that he left SSE because the organization needed to be closer to classical science, and that conventional scientists *could* be changed, but that such change requires a lot of work. In my opinion, the too-quick acceptance of wild claims by top SSE members reduces the credibility of their work to that of tabloid stories. They could (and should) do much better. In the words of attendee Robert L. Park of the American Physical Society, writing on the conference in the June 11 edition of his *What's New* newsletter: "Alas, to wear the mantle of Galileo it is not enough that you be persecuted by an unkind establishment, you must also be right."

David E. Thomas is a SKEPTICAL INQUIRER *consulting editor and president of New Mexicans for Science and Reason. He is a physicist.*

Bennett Braun Update: Poznanski Settles, Will Testify Against Braun

As reported in previous issues (see SI March/April and January/February 1999), the Illinois Department of Professional Regulation (IDPR) filed a complaint against psychiatrist Bennett Braun, a leader in the repressed memory movement, child psychiatrist Elva Poznanski, and psychologist Roberta Sachs over their treatment of Pat Burgus and her sons. The Braun proceedings have been postponed until November so the Burgus children would not have to miss final exams. Sachs has not been assigned a hearing date yet.

In surprising news, the Poznanski case has been settled without action being taken against her medical license. A consent order between Poznanski and the IDPR explains the terms of this agreement, and lead prosecutor Thomas Glasgow further clarified why they settled with her.

The most important part of the order discusses her future cooperation in the Braun case. It says she must "cooperate fully with the Department, and with any federal, state or local law enforce-

ment agency as directed by the Department, in any investigation connected to the treatment of any person or persons in Rush-Presbyterian-St. Luke's Medical Center's Dissociative Disorders Unit, or in any Medicare or Medicaid fraud investigation resulting from any action of physicians, health care workers or staff members at Rush-Presbyterian-St. Luke's Medical Center related to patients treated in that Unit during the period the Unit was in existence."

In other words, she will testify against Braun and Sachs in the IDPR hearings, and will then continue to help in any further cases. Glasgow, when asked if this meant there were going to be such cases in the future, said he was not at liberty to discuss any cases or investigations that might or might not be ongoing.

The order spells out that she must step down as the head of child psychiatry at Rush hospital within two years and she cannot provide any future recovered memory or satanic ritual abuse therapy. Poznanski also conceded that, given what she knows now about the Burgus family history, the therapy given to Pat Burgus, and research "documenting the lack of reliability of memories of abuse elicited in recovered memory therapy, including the substantial evidence suggesting that numerous patients in such therapy have been induced to describe nonfactual 'recovered memories' of satanic ritual abuse," she would not have treated the Burgus children the way she did in this case.

A number of factors were considered in the decision to settle. The most important was that Poznanski, unlike Braun and Sachs, has apparently only been involved in this one case. The other two have had several complaints filed against them, and played major roles in the treatment of those involved. Poznanski played a minor role and treated the children as though they had been abused—not as if they were part of a satanic cult.

Glasgow noted that Poznanski, in her seventies, has already lost much of her good reputation because of this case. In addition, she "took remedial action" by withdrawing cooperation from Braun and Sachs less than halfway through the treatment, when Braun allegedly brought guns in with the children. Up until then, she had agreed to work with Braun due to his standing in the psychiatric community, but finally decided things had gone too far. After that, she did keep the children under her care because she did not feel Patricia Burgus was a fit mother at the time (Burgus was still under Braun's care).

Glasgow noted that having somebody from the "inside" testify will be very helpful and overrides any need to prosecute her separately.

Also, the Burgus family—the victims in this case—were consulted and agreed with the settlement before it was reached.

Glasgow took pains to point out that he would never make a deal like this with Braun, and the only thing he would settle for, should Braun seek a deal, would be the indefinite suspension of Braun's license to practice medicine—which is what he hopes to gain from prosecuting Braun anyway.

—David Bloomberg

David Bloomberg is the chairman of the Rational Examination Association of Lincoln Land and can be reached at chairman@reall.org.

Psychologist Wants Constitutional Protection for Exorcism Done in Therapy

A clinical psychologist told a federal appeals court that he has a Constitutional right to perform exorcisms, according to a decision July 1 from the Ninth Circuit Court of Appeals in California.

The psychologist, Kenneth Olson of Phoenix, performed an exorcism on a child referred to him by Child Protective Services of Arizona. An ordained Lutheran minister, Olson insisted he had a First Amendment right to practice his religion by ordering demons to leave a patient's body during a therapy session.

The appeals court decision, entitled *Olson* v. *Morris*, says that the boy's foster father believed the child to be the victim of satanic abuse by his biological parents. The foster father discussed the matter with his own minister, and was referred to Olson.

The foster father gave Olson's name to the boy's caseworker at Child Protective Services. The caseworker, in turn, referred the child to Olson and agreed to have the State of Arizona pay for the therapy.

According to court records, Olson held an exorcism on at least one occasion. The doctor laid his hands on the child and prayed to the Holy Spirit to reveal and remove the youngster's demonic spirits. He later sent a bill to Child Protective Services for the "treatment."

When the caseworkers realized what was going on during the psychotherapy, they complained to the Arizona licensing board responsible for psychologists. The board held a hearing, and revoked Olson's license for "unprofessional conduct."

Olson did not bother to bring an attorney with him to the licensing board's hearing, he said, because he never imagined they might rule against him. He simply told the board that his treatment modality was appropriate. The licensing board did not agree.

Olson responded by filing a federal lawsuit for violation of his Constitutional right to religious freedom. He expressed outrage that the licensing board would restrict his use of prayer therapy. His lawsuit alleged violation of federal civil rights law that forbids any state from abridging a citizen's Constitutional rights. In addition, he demanded an injunction to stop the licensing board from interfering with his religious freedom.

The federal judge dismissed Olson's suit against the licensing board. Undeterred, he appealed to the U.S.

Circuit Court of Appeals in California.

Without commenting on the merits of exorcism, the appeals court ruled against Olson, noting that he should have appealed the licensing board's decision through proper channels before filing suit in federal court.

Ironically, Constitutional rights to religious freedom probably contributed to the child's plight in this case. Child protective workers are employed by the government. When someone applies for a foster care license, government employees are reluctant to ask about the applicant's religious beliefs.

The foster father described in this case may actually believe that witches are lurking about, performing secret satanic rituals at midnight in cemeteries, and exhibiting supernatural powers. That belief would not have affected his ability to apply for a foster care license, since government agencies do not discriminate against foster parent applicants on the basis of religion.

—Martha Churchill

Martha Churchill is an attorney in Michigan who writes on many issues including false memory syndrome and hysterias.

Hubbard Statistics Course Taken to Court

When Susan E. Morgan became a receptionist for dentist Roger N. Carlsten of Providence, R.I., she discovered a whole new way to look at statistics.

Carlsten told her she needed to take a course in Hubbard Administrative Technology. He described it as a "statistics" course. But the course on "How to Increase Productivity by Managing Personnel on Statistics" included references to "the God dynamic" and "the Supreme being." It turned out to have been written by the late science fiction author L. Ron Hubbard, the founder of Scientology.

Morgan, a Catholic who suspected that Carlsten was trying to convert her to *Scientology, refused on religious grounds.* Carlsten fired her.

The dispute surfaced after Morgan sued Carlsten in Rhode Island Superior Court, alleging a violation of the Rhode Island Employment Fair Practices Act. Morgan said Carlsten failed to accommodate her beliefs as a Catholic and fired her "based on religion." She claimed $12,000 in lost wages, medical benefits, and costs.

Carlsten testified that he learned about Scientology after traveling to California to learn about Hubbard *Management Technology.* The courses were given by Sterling Management, a taxable corporation licensed by the Church of Scientology. A year later, he returned to California and embraced the religion.

He said he urged Morgan, over an eight- or nine-month period, to take the course, which began in February 1991. He said the courses contained no religious content.

When Morgan asked if she could take a course elsewhere, Carlsten turned down that request. "I didn't have any faith in the content of that course," he testified.

As part of the effort to get Morgan to take the statistics course he wanted, Carlsten hired a business consulting firm, Precision Management, to help persuade her. Precision's consultants, both Scientologists themselves, ultimately recommended that Morgan be fired. Carlsten took that advice, but claimed in the trial that the firing was for poor job performance.

Precision Management is run by Randy Baxter, also a Scientologist. Baxter testified that he also teaches the course Carlsten wanted Morgan to take. The consultant told the court that he received his consultant license through Hubbard College of Administration in Los Angeles. Hubbard College is, in turn, licensed by the World Institute of Scientology Enterprises.

"These courses are not Scientology, or related to religion," Baxter testified.

Morgan didn't agree, claiming that the course was "thinly veiled Scientology" *and noted that the glossary in* the course materials included this explanation: "The eighth dynamic is the urge toward existence as infinity. This is also identified as the Supreme Being. This is called the eighth dynamic, because the symbol of infinity stood upright makes the numeral '8.' This can be called the infinity or God dynamic.'"

Judge Alice B. Gibney told the six-member jury that the first question that they should consider was whether "the courses were religious in nature and violated her religious beliefs." The jurors took forty minutes to decide that the answer was "no" and Carlsten had won.

Morgan's lawyer vowed to appeal, saying that Gibney was wrong to not allow evidence about the beliefs of Scientology to be introduced. The judge decided to keep that evidence out because it would likely "inflame the jury into 'punishing' Carlsten" for his "unusual religion."

—C. Eugene Emery Jr.

Gene Emery is a reporter for the Providence Journal. *This summary is based on* Providence Journal *articles written by Karen Lee Ziner.*

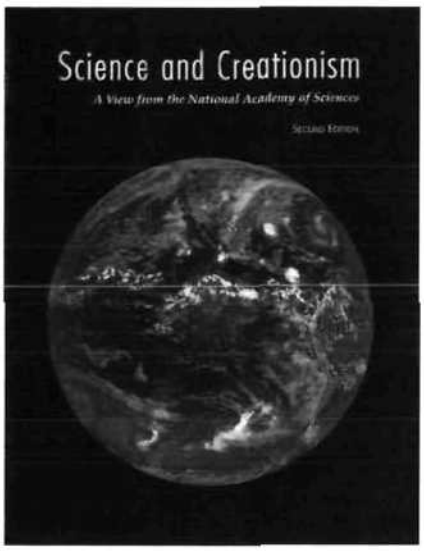
NAS Publishes New Version of *Science and Creationism* Report

A major revision of the National Academy of Sciences' 1984 publication *Science and Creationism,* updated with the latest discoveries in evolutionary science and including refutation of the "new" intelligent design creationism, has just been published.

Science and Creationism: A View from the National Academy (see New Books, p. 56) is a companion volume to last year's widely publicized Academy publication, *Teaching About Evolution and the Nature of Science* (SI, July/August 1998), which was addressed to teachers, educators, and policy makers. Like the 1994 report, *Science and Creationism* is a brief,

easy-to-read, well-designed publication filled with color photos and illustrations and pertinent discussions and definitions about evolutionary science and the problems with creation "science."

Key sections cover the origin of the universe, Earth, and life; evidence supporting biological evolution, including findings from paleontology, comparative anatomy, biogeography, embryology, and molecular biology; and human evolution. An appendix of "frequently asked questions" is borrowed from the 1998 report.



Science and Creationism can be ordered from the Academy, but both the 1998 and 1999 reports are also on the Web at: http://books.nap.edu/html.creationism/. The new one is 35 pages long.

Academy President Bruce Alberts says the new edition of *Science and Creationism*, like the 1998 NAS report, summarizes some of the key evidence supporting evolution and analyzes arguments by creationists, but he says that it nevertheless has "a somewhat different purpose."

"This document lays out for a broader audience the case against presenting religious concepts in science classes," Alberts says.

"Scientists, like many others, are touched with awe at the order and complexity of nature. Indeed, many scientists are deeply religious," says Alberts. "But science and religion occupy two separate realms of human experience. Demanding that they be combined detracts from the glory of each."

"Intelligent design theory" is one of the neocreationist positions addressed in the new publication. "Molecular evolutionary data counter a recent proposition called 'intelligent design theory,'" the report says. Intelligent design has its roots in the views of eighteenth-century cleric William Paley, who saw the hand of an omnipresent designer in the intricate anatomy and workings of complex organisms.

Proponents of modern-day intelligent design argue that molecular structures such as DNA, or molecular processes such as the steps blood goes through when it clots, are so irreducibly complex that they can function only if all the operational steps are in place at once—therefore seemingly making gradual evolution an impossible explanation.

"However," says the report, "structures and processes that are claimed to be 'irreducibly' complex typically are not on closer inspection." It gives many examples. "Similarly, evolutionary mechanisms are capable of explaining the origin of highly complex anatomical structures," such as eyes, which developed independently many different times.

"Creationism, intelligent design, and other claims of supernatural intervention in the origin of life or of species are not science because they are not testable by the methods of science," concludes the report. "No body of beliefs that has its origin in doctrinal material rather than scientific observation, interpretation, and experimentation should be admissible as science in any science course."

CSICOP Fellow and Executive Council member Eugenie Scott, an anthropologist, was one of the contributors to the report, which was reviewed by an expert panel.

—Kendrick Frazier

Kendrick Frazier is Editor of the SKEPTICAL INQUIRER.

Missing Bodies Found Despite Psychics' Tips

Detective Barbara Bergen, the lead investigator on an Orlando missing-persons case, received a tip this past June from a caller advising her to search a retention pond near Disney World. In the preceding six months, authorities had already removed about a half-dozen vehicles—some ditched by thieves, others there by tragic accident—from the body of water, which (until a restraining wall was recently erected) had been a slam-dunk for drivers failing to negotiate a sharp left turn near Interstate 4 in the town of Celebration.

Heeding the caller's advice, the pond was again searched, and a sport utility vehicle, along with the bodies of three Massachusetts men missing for nine months, was found. High speed, not foul play, was the suspected cause of what had been a mysterious disappearance.

The three men had arrived in Florida in September 1998 for a short vacation. The mens' families sought information on their whereabouts through a Web site and a television campaign.

Just who was the prescient prognosticator being credited by the police for cracking the case? Psychics from three states had contacted family members with various suggestions as to where to look, including a storage facility in northern Florida, a remote wildlife area in central Florida, and a marshy area in southern Florida.

But the tipster, whose advice had led to the successful extraction of the vehicle and bodies, turned out to be—naturally—a dentist! Detective Bergen told the *Boston Globe*, "He was driving along talking to his wife when he realized he'd missed the turn and nearly skidded over the curb and into the pond." Hearing of the missing men and recalling his own chilling near-miss, "He suggested we search the pond."

—Gary Posner

Gary Posner is founder of the Tampa Bay Skeptics and a CSICOP consultant.

Fund for the Future

CSICOP AT THE CENTER FOR INQUIRY

CFI-International
Amherst, N.Y.

1999 PRIORITY

Using the Media & Telecommunications to Promote Science and Reason

The Fund for the Future is a capital campaign to provide CSICOP with the resources needed to more effectively influence media and public opinion. The 90s have been defined by a telecommunications revolution, along with an explosion of misinformation available to the scholar and citizen alike. The hunger for superstition, pseudoscience, the paranormal and miraculous solutions has never been more acute.

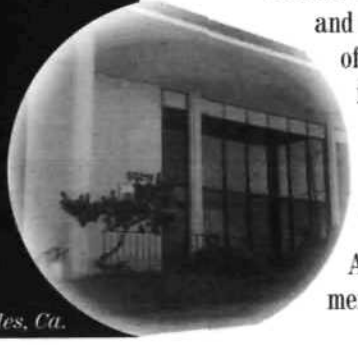
THE TEN-YEAR PLAN

CFI-Midwest
Kansas City, Mo.

1999 Contributions are needed for current priorities:

- Increased media appearances by skeptical spokespersons
- Press releases, opinion pieces and media alerts
- Greater exposure through the Internet, including webcasting
- National initiatives coordinated by the Council for Media Integrity
- Instructional materials introducing skepticism to elementary and secondary school students
- Video production

HOW CAN YOU HELP?



CFI-West
Los Angeles, Ca.

CSICOP has established its expertise and integrity. It's time to command more media attention and a larger audience. The Center for Inquiry Fund for the Future is about new methods of outreach and broader influence, and is driven by an ambitious ten-year strategic plan for growth.

We depend on the support of readers and friends to continue leading the international skeptical movement. Gifts to the Fund for the Future provide the resources we need to respond to today's challenges.

All gifts are gratefully accepted. The Fund for the Future welcomes gifts of encouragement and major investments.

Cash contributions and gifts of stock are needed for immediate growth and new initiatives. We also offer a range of planned giving opportunities, from bequests to assorted tax-advantaged trusts and pooled funds. Planned gifts support our work in the future and can provide an income stream for you and a beneficiary. You may also make a gift supporting the general endowment, or establish a special purpose fund underwriting a long-term project that expresses your personal interests and commitment to skepticism.

In today's stock market, gifts of highly appreciated securities offer particular advantages to the donor. When donating stock to a charitable organization, you avoid taxes and maximize the impact of the asset you are donating.

Contact Anthony Battaglia at (716) 636-7571 ext. 311 or via e-mail at CFIANTHONY@AOL.COM to discuss accomplishing your philanthropic and financial goals and contributing to the Fund for the Future.

Bill Nye "The Science Guy," Joe Nickell, and entertainer Steve Allen appear on a radio show.

CSICOP
at the Center for Inquiry
P.O. Box 703
Amherst, NY 14226-0703
(716) 636-1425 ext. 311
Fax (716) 636-1733

Co-chairs of the Fund for the Future Campaign: above, author and TV personality Steve Allen; below, author and critic Martin Gardner.

COUNCIL FOR MEDIA INTEGRITY

Formed just weeks after its inclusion in the Ten-Year Plan, the Council for Media Integrity monitors and challenges media programs that convey unfounded claims and mislead the public about science. Members include Steve Allen (co-chair), E. O. Wilson, Stephen Jay Gould, and many others. CSICOP will invest in electronic infrastructure to facilitate rapid response to irresponsible programs.

ENHANCED LIBRARY RESOURCES

The Center for Inquiry's skeptics' library—already the finest of its kind in the world—needs additional funding to enlarge its core collection and add electronic media. Worldwide modem access to the library's catalog is already nearly complete.

ADULT EDUCATION

The Council cosponsors the Center for Inquiry Institute, which has already expanded its offerings to include a new three-year certificate program in science and skepticism. Courses are scheduled in Amherst, Los Angeles, and other cities.

REGIONAL OUTREACH

With the establishment of The Center for Inquiry–West (Los Angeles), The Center for Inquiry–Midwest (Kansas City) and The Center for Inquiry–Rockies (Boulder, Colorado), giant steps have been taken to enhance direct field service to skeptical activists. Additional regional centers are planned, with expanded calendars of activities.

FOCUSING UPON THE YOUNG

To present the skeptical message more compellingly to the young, CSICOP will develop new materials—ranging from age-appropriate print publications to audio and video cassettes and instructional coursework. Goals include enhanced understanding of science and improved critical thinking skills.

Sorcerers and Psychics in Politics

The Reagan White House was not the only place mixing the paranormal with politics. In La Plata, Argentina, a sorcerer was enlisted to remove a curse preventing the current governor of Buenos Aires from becoming president. No Buenos Aires governor has ever been elected president, and many believe it to be the result of an 1882 curse by a witch named La Tolosa. According to legend, she cursed the province's rulers while walking counterclockwise around Moreno square, in the city center.

Self-proclaimed psychic and sorcerer Manuel Salazar exorcised the curse in June, repeating the witch's ritual but in a clockwise direction. As of this writing, current Buenos Aires governor Eduardo Duhalde is slightly trailing his opponent, although his difficulty is likely due to Argentine president Carlos Menem's long reluctance to support him.

In Jakarta, Indonesia, fortunetellers and psychics were heavily consulted in the months prior to Indonesia's parliamentary elections in June. One of Indonesia's most famous psychics, Permadi, is a candidate for the popular Indonesian Democratic Party-Struggle, headed by Megawati Sukarnoputri, daughter of Indonesia's founding president Sukarno. Sukarno is said to have routinely consulted psychics before deciding important matters of state policy. Other high government officials are rumored to have asked wizards to cast spells to boost their careers or undercut rivals.

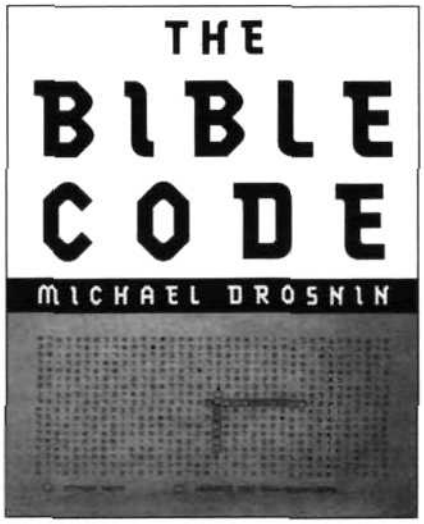
Permadi foresees victory for Megawati, framing his prediction in Nostradamus-like cryptobabble: "There will be disruptions and chaos before or after the elections," he said in a Reuters interview. "There will be deadlock. And, amid the disruption and chaos . . . a white knight will emerge." Another soothsayer, Lukito, who based his predictions on Chinese *feng shui* geomancy, helpfully suggested, "There is a possibility of a bloodbath if people cannot control their emotions."

—Benjamin Radford

Ben Radford is Managing Editor of the SKEPTICAL INQUIRER.

Bible Code Redux: McKay Rebuttal Published in *Statistical Science*

One of the chief arguments employed by proponents of the Bible Code is to mention that the original code proponents, Witztum, Rips, and Rosenberg, published a paper supporting the phenomenon in the journal *Statistical Science* in 1994, and that, to date, no rebuttal has ever been published there. But just such a paper, authored by Brendan McKay, Dror Bar-Natan,



Maya Bar-Hillel, and Gil Kalai, was published in the May 1999 edition of *Statistical Science*. The authors show definitively that the secret of the codes lies not in any special properties of Genesis, but rather in methods by which the lists of modern names and dates were chosen. These methods have so much "wiggle room" that spectacular results can also be achieved in secular, "non-coded" texts such as *War and Peace*. McKay and his co-authors also show that several very reasonable measures of code effectiveness, much less convoluted than the complicated one chosen by Witztum and Rips, show no trace of the alleged "encoding" in Genesis or other books of the Torah. The article, and many others, are available on the Web at http://cs.anu.edu.au/~bdm/dilugim/torah.html.

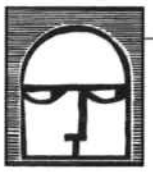
—David E. Thomas

Psychic Hotline Provider Accused of Fraud

In June, the Federal Trade Commission forced a major provider of 900-number psychic hotlines to drop nearly $40 million in "phantom" phone charges to consumers. The company, AmericanTel-Net Inc., will also pay $2 million for customers who had already paid disputed charges. The FTC had accused American Tel-Net of falsely billing consumers even though the consumers had not used the company's services. The company was also accused of failing to properly disclose prices and charging consumers for "setting up" time that is required by law to be free. This marks the second time the FTC fined the company; in 1994 American TelNet paid $2.5 million over similar improper billing practices.

Also in June, Cheryl Burnham, a clerk at a county juvenile facility outside of Los Angeles, was accused of racking up $120,000 worth of telephone calls to psychic hotlines while at work. The 39-year-old woman faces charges of felony grand theft and commercial burglary. The calls, some 2,500 of them, were made at night and on weekends between June 1997 and November 1998.

—Benjamin Radford □



NOTES OF A FRINGE-WATCHER
MARTIN GARDNER

Carlos Castaneda and New Age Anthropology

Among American anthropologists a raucous minority believe firmly in the reality of ESP, PK (psychokinesis), precognition and other psychic wonders, especially in the paranormal powers of the shamans or sorcerers of primitive cultures. Last March a section of the American Anthropological Association, calling itself the Society for the Anthropology of Consciousness, sponsored a five-day conference at the University of California at Berkeley. It was their nineteenth spring conference.

I did not attend, nor have I sent $140 for tapes of the fifty lectures by counterculture speakers, but I do have a copy of the meeting's 27-page program sent to me by my friend Jim Breese. "A few issues back," he said in a letter, "you deplored some current agenda at Temple University. Well, if you think that's bad, have a look at the enclosed program."

I was indeed appalled by what I saw. What startled me most was the number of speakers who enthusiastically praised the late bogus anthropologist Carlos Castaneda.

Not much is accurately known about Carlos because he was known to fabricate information about his life. He so successfully evaded efforts to photograph him that the only photo published in the U.S. that shows his face clearly was taken at a college graduation in 1959. It is now known that he was born in 1925 as Carlos Cesar Arana Castaneda, in Cajamarca, Peru (not in Brazil as he often claimed). After finishing high school in Lima, he married a few years later, but deserted his wife and child to come to California in 1951. For a few years he lived in San Francisco, then moved to Los Angeles where he took courses in journalism and creative writing at Los Angeles City College. In 1960 he married Margaret Runyon. They lived together for only six months, but were not divorced until thirteen years later.

A photograph of Margaret accompanies her article "My Husband Carlos Castaneda," in *Fate* (February 1975). She describes him as five feet five, dark eyes, curly black hair, and with thighs and legs "disproportionately short." His face was round and cherubic, his skin nut-brown.

Carlos had a habit of suddenly vanishing, to return unexpectedly without telling Margaret where he had been. Phone calls were always made from public booths. There were periods, she writes, when he drove a taxi, kept accounts for a ladies apparel shop, and clerked in a liquor store from which he would bring her "wonderful wines." These jobs may or may not have been real because it was never possible to know when Carlos was telling the truth. Letters to his wife were unsigned.

In 1968 Carlos was an anthropology student at the University of California at Los Angeles (UCLA) when the university's press published his first book, *The Teachings of Don Juan: A Yaqui Way of Knowledge.* The book hit the New Age market like a bombshell. Sales went through the roof and Castaneda became instantly rich and famous.

The book tells how Castaneda, on a field trip to Mexico in 1960, met Don Juan at a dreary bus depot in Arizona. He turned out to be an elderly Yaqui sorcerer with vast magical powers and a habit of giggling even more often than the Maharishi of Transcendental Meditation. Castaneda became Don Juan's apprentice. His progress involved the frequent taking of such drugs as peyote cactus, Jimson weed, and various hallucinogenic mushrooms. The book's main theme is that beyond our ordinary world is an extraordinary realm in which one can talk to animals, even become animals, and experience all sorts of wonderful miracles. This other world, so familiar to Yaqui shamans, is just as real as this one.

Castaneda followed his first book with nine others, all best sellers, which were translated into some twenty languages. In order of publication they are: *A Separate Reality: Further Conversations with Don Juan; Journey to Ixtlan: The Lessons of Don Juan; Tales of Power; The Second Ring of Power; The Eagle's Gift; The Fire From Within; The Power of Silence; Further Lessons of Don Juan;* and

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Martin Gardner's latest book is Visitors from Oz.

The Art of Dreaming.

In 1972 the UCLA, in a fit of self-deception, gave Carlos a doctorate in anthropology. His thesis was based on *Journey to Ixtlan.* Although the public, smitten by New Age fantasies and the pleasures of mind-altering drugs, gobbled up Castaneda's books, mainstream anthropologists were outraged. Careful investigations found his books riddled with contradictions, outright errors, and rafts of material pilfered from other authors. Don Juan existed only in Carlos's imagination. As sociologist Marcello Truzzi was the first to say, Castaneda's books were the greatest science hoax since the Piltdown Man. Irate anthropologists demanded that the university withdraw Castaneda's Ph.D. It refused. Professor Walter Goldschmidt, then chairman of the university's anthropology department—who wrote a fulsome forward to Castaneda's first book—said in 1978: "We possess no information that would support the charges. . . . I am not going to say *mea culpa.*"

This fall the University of California Press, motivated by shameless greed, will issue the thirtieth anniversary edition of Carlos's first book. They will be promoting it, not as a work of pseudo-anthropology, but as a classic still relevant to readers longing to escape from the dull world of ordinary reality to a magical land of Oz.

I don't have the space to relate the thousands of paranormal events described in Castaneda's ten fantasies. I will mention only the funniest. In his first book Carlos tells how Don Juan, high on drugs, transformed him into a crow. Mind you, this was no hallucination. Carlos became a real, live crow. When Don Juan tossed him into the air, he flew away. The sorcerer told Carlos that three crows would signal his death and that after he died he would be reincarnated as a crow.

It is hard to believe that some anthropologists still consider Castaneda to have been a serious, competent researcher into the stupendous wonders of Yaqui Indians. Here are glimpses at some of the abstracts of papers delivered at the March meeting of the counterculture anthropologists.

Amy Smith, of Salt Lake City, Utah, spoke on "A Castaneda Way of Knowledge: Implications of an Anthropological Legacy." She describes Castaneda's work as "personally exploring non-ordinary states of consciousness, addressing the existence of multiple realities and other unusual phenomena, using both emic and etic interpretations, and documenting and reporting these experiences

Time Syndication

through a narrative ethnography were ground breaking achievements that remain essential to the field."

Edith Turner, of the University of Virginia, in her paper on "The Teachings of Castaneda," sees his research as a great liberation. "He has taken us—like Dante—through a dark passage out the other side into a state of enlightenment." He has freed us from "capitalism, communism, consumerism, Church rationality and exclusivism; from reductionism, fundamentalist Marxist scientism and its type of elitism, which condemns the folk; and lastly from nihilism, the eternal war of revenge upon the sins of many societies which can never be forgiven." Not only that, but "we are allowed to talk with empathy, for instance, about the Nigerian sacred Bori personage, about the Hindu guru, the Brazilian *mae de santo,* Rumi, the Tibetan oracle, Jesus, the Bal Shem Tov, the Dalai Lama, Black Elk, and at last, Don Juan." Whew!

Roy Wagner, also at the University of Virginia, calls his paper "Consciousness is that Part of Consciousness of which we are Conscious: How the Ancient Seers and Shamans of Mexico Short-Circuited the Energy-Body." I fail to grasp what he means when he adds: "For having devastated the 'inner' (subjective, imaginal, hence 'heuristic') support for our ability to conceptualize things in the world, Don Juan has turned the whole 'subjectivity' fantasy inside-out: we do not 'think' his lessons except insofar as they think us."

Michael J. Winkelman, of Arizona State University, spoke on "Epistemological Perspectives on Castaneda." His abstract reads in full:

> Castenada's concepts such as "Separate Reality," "stopping the world," and "tonal and nagual" are analyzed from an epistemological perspective. His approaches to the sorcerer's practice were explicitly epistemological, centrally concerned with processes through which human conceptual processes are structured and contribute to the reality known. Central aspects of Castenada's training involved learning how to suspend the ordinary epistemological constructs and enter into a "natural epistemological mode." These innate constructs of nature and the human brain/mind are revealed by comparing them to similar epistemological systems and practices found in other contemplative disciplines. The nature of the sorcerer's epistemological development is assessed from the perspectives of genetic epistemology.

Other abstracts of papers given at the conference are written in the same murky, mind-numbing jargon. Here are a few samples.

"Insights from anthropological linguistics include indigenous knowledge of telepathy in natural communication, and discovering human languages of wholeness. . . ." (Dan Moonhawk Alford, California State University.)

"In children with MPD [Multiple Personality Disorder], the Original Personality goes for safekeeping from Physicalspace into Thoughtspace, where it is cared for by wise and loving collections of intelligent energy." (Ralph Allison, of Los Osos, California.)

"Cultural manifestation of human consciousness are the result of both immanent and transcendent aspects of a principle of action stemming from a

philosophical tension inherent in the nature of awareness." (Richard L. Amoroso, of the Noetic Institute.)

"The culturally diverse delineation of these experiences will be considered while discussing the posited referencing of the extrasensory experiences in question within the context of an energetic-wave world view." (Renate Dohman, of Goldsmith College, London.)

The conference's keynote address, on "The Varieties of Dissociative Experience," was given by Stanley Krippner, a well-known parapsychologist. Here is how the meeting's program described his speech:

> Stanley Krippner will describe a cross-cultural, postmodern, transpersonal model of dissociation based on the work of Ruth-Inge Heinze and Rhea White. Dissociation is contrasted with flow, identification with the ego-self is contrasted with identification with the All-Self, control is contrasted with loss of control. Each of these examples of dissociation and integration is evaluated on the basis of whether it is socially constructive or destructive. Examples will include (among others) dissociative identity disorder, "channeling," shamanic journeying, and acting. First person accounts will be cited; for example, Robert Louis Stevenson, Edgar Bergen, Shirley MacLaine, Chris Sizemore ("Three Faces of Eve"), Maria Sabina, and J.Z. Knight (who "channels" Ramtha).

Unbounded praise of Castaneda by New Age anthropologists can be found in many books. The wildest reference is *Extrasensory Ecology: Parapsychology and Anthropology* (1977), a collection of papers edited by Joseph K. Long. (See Richard de Mille's biting review in SKEPTICAL INQUIRER, Spring/Summer 1978, pp. 108–112.) The book's first paper, by Long, is about Castaneda. He calls Castaneda's first book "one of the most important books in the field of anthropology."

The book's second paper is a vigorous attack on Castaneda by Agehananda Bharati, but most contributors to this bizarre anthology are great admirers of Castaneda. Margaret Mead, for instance, writes: "Carlos Castaneda has developed a method which makes the American Indian religious experience available to non-anthropologists who would never be able to get the same experience from rereading interlinear texts."

William S. Lyons's paper defends the ability of psychics to "see" things in nonordinary reality, such as seeing human auras. "If, for example, the director of the National Science Foundation could 'see' what Don Juan claims to 'see', psychical research would be more than likely to be as readily funded as body language research." Long, commenting on this paper, suggests that the pineal gland, or "third eye," is the "point of focus" in the kind of "seeing" described by Castaneda. In a paper on the evolution of psi, Long defends Castaneda's accounts of the psychic abilities of certain animals and birds. On page 261 Long calls Shirley MacLaine an "erudite amateur anthropologist."

Long's ludicrous book must be read to be believed. Jule Eisenbud, who for a decade tried to persuade the world that Ted Serios could project his thoughts onto Polaroid film, writes on "Perspectives in Anthropology and Parapsychology." Long thinks Eisenbud's book on Serios is "one of the best documented cases ever presented for a regular PK effect." Physicist Evan Harris Walker, writing on "The Compleat Quantum Mechanical Anthropologist," assures us that quantum effects explain Uri Geller's ability to bend spoons.

Two leading proponents of psychic archaeology, J. N. Emerson and Jeffrey Goodman, each contribute to Long's book. Goodman tells how a psychic in Oregon went into trances and remote viewed a spot in Flagstaff, Arizona. The accuracy of his visions enabled Goodman to discover deeply buried artifacts.

Goodman believes that the Garden of Eden was not in Africa but in California. He denies that American Indians came here across the Bering land bridge from Asia. They went the other way, California to Asia! From California they migrated to Africa and other parts of the world. And where did these California Indians come from? In Goodman's first book *Psychic Archaeology: Time Machine to the Past* (1977) a map shows how they came, from the lost continents of Atlantis and Lemuria!

Goodman's second book, *The Genesis Mystery: A Startling New Theory of Outside Intervention in the Development of Man* (1983), rehashes his earlier book but adds surprising new material. He claims that Darwin stole all his ideas from Alfred Wallace. Although our bodies evolved from lower animals, a sharp transition took place when God planted human souls in bestial bodies. Goodman seems unaware that he is defending current Roman Catholic opinion.[1]

Carlos Castaneda died in Westwood, California, in 1998. "His only real sorcery," writes Kathryn Lindskoog in her book *Fakes, Frauds, and Other Malarky*, "was turning the University of California into an ass." The next time you come close to a crow, try calling out "Hello Carlos!" If you are high enough on peyote, you might hear the bird answer.

Note

1. See Kenneth Feder's article "American Disingenuous: Goodman's 'American Genesis'—a new chapter in 'Cult' Archaeology," in SKEPTICAL INQUIRER, Summer 1983, pp. 36–48; J. R. Cole's review of Goodman's *Psychic Archaeology*, in SKEPTICAL INQUIRER, Spring/Summer 1978, pp. 105–108; and his review of *The Genesis Mystery in American Antiquity*, Vol. 50, 1985, pp. 692–93.

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INVESTIGATIVE FILES
JOE NICKELL

Miracles or Deception? The Pathetic Case of Audrey Santo

As we near the next millennium, the media have been pointing to "millennial madness" as the source for a wide range of divine claims. Yet the faithful have been seeking miracles and finding them—they believe—in unlikely forms and places for years. These include apparitions of the Virgin Mary (for example in the Bosnian village of Medjugorje, beginning in 1981), bleeding statues and crucifixes (e.g., in Quebec in 1985), and miraculously appearing images, such as the portrait of Mary seen in a splotch on a tree in Los Angeles in 1992 (Nickell 1993; 1997). Now there are reported healings and other "miraculous" phenomena attending a comatose teenage girl in Worcester, Massachusetts.

Pilgrims currently stream to the home of Audrey Santo who has been bedridden since 1987, when, at the age of three, a near-drowning left her in an unresponsive condition. Visitors to the home chapel, converted from a garage, report healings after being shown statues that drip oil and communion wafers that bear smears of blood.

Skeptics may not be guilty of excessive doubt when they wonder how and why a tragic figure who cannot heal herself is able to heal others. The Catholic Church is often skeptical of such extra-canonical phenomena as well. It has distanced itself from Medjugorje (where six children supposedly conversed with the Virgin Mary), and the local bishop proclaimed the Medjugorje affair a fraud.

Interestingly, a year after Audrey's accident, her mother, Linda Santo, spent $8,000 to take her to Medjugorje in hopes of a miracle. As even a sympathetic priest admitted: "On a rational level, this was an extremely absurd idea. It was absurd. It should not have been done. It was medically wrong. And I think from all kinds of angles, sane people would say it was even spiritually wrong" (Sherr 1998). Expecting her daughter to be cured, Linda Santo bought her sandals so she could walk. But as it happened, instead of being helped, Audrey suffered a sudden cardiac arrest. She was revived but had to be returned home by air ambulance at a cost of $25,000—a bill her grandmother mortgaged her home to pay. Linda Santo's response to the near-fatal incident was to blame it on the proximity of a Yugoslavian abortion clinic (Harrison 1998; Sherr 1998).

Skepticism of miracle claims is often warranted. For example, newsmen from the Canadian Broadcasting Corporation were able to borrow one of the Quebec "bleeding" statues and to have it scientifically analyzed. The blood had been mixed with pork fat so that, when the room warmed from pilgrims' body heat, the mixture would liquefy and run like tears. A more innocent explanation was afforded the tree-splotch "Virgin" in Los Angeles: A tree expert determined a fungus was responsible. There seems, however, little incentive for Church prelates to adopt a critical stance. Clerics who debunked a perambulating and weeping statue in Thornton, California, in 1981, for example, were denounced for their efforts by religious believers who called them "a bunch of devils" (Nickell 1993, 67–68).

Nevertheless, in the Santo case, the Worcester bishop appointed a theologian and two psychologists to form an investigating commission. Their preliminary report was issued on January 21, 1999, and I appeared that evening on *The NBC Nightly News with Tom Brokaw* to offer a brief skeptical view of the case.

Among other things, the commission members showed skepticism toward claims that Audrey is a "victim soul" (one who suffers for others). Stating that this is not "an official term in the Church," the report noted that "It was used in some circles in the 18th and 19th century when there was a fascination with suffering and death." It remained to be determined, the commission concluded, that Audrey demonstrated "cognitive abilities" or "at the age of three was, and presently is,

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capable of making a free choice to accept the suffering of others." In fact, doctors say that Audrey exhibits "akinetic mutism"—a comalike state. Except for her eyes, which restlessly blink and wander, the tragic teenager remains virtually motionless. When ABC's *20/20* reporter Lynn Sherr placed her hand in Audrey's she received, she thought, a slight squeeze, but when she tried again there was no response (Sherr 1998).

Nevertheless, Linda Santo rejects the idea that her daughter is unresponsive: "She cannot speak, but she knows everything. She is not in a coma . . . she's in that room with her Jesus seven days a week, adoring him, waiting on him, serving him, and he's blessing her." She even says that Audrey appears to people—"in person or in dreams"—and when she does so "is moving and speaking" (Harrison 1998).

Linda Santo believes Audrey has worked many miracles. She cites the case of a young man injured in a motorcycle accident whose doctors had reportedly said he would never be able to walk again; yet on the same day his mother had gone to see Audrey he began to walk without his crutches. Actually, according to his personal physician, there had been a good likelihood—a 75 percent chance—that he would indeed walk (Sherr 1998).

Another case cited by Linda Santo concerned a woman supposedly healed of liver cancer through Audrey's intercession. In fact, however, the patient's oncologist pointed out that she had already begun a new cancer treatment and that it had clearly begun to work even *before* she had gone to see Audrey. The woman continued to regard the remission as a miracle even when the cancer returned, spreading to her brain ("Desperate" 1999).

On the *20/20* segment, titled "The Miracle of Audrey" (first broadcast October 4, 1998), Lynn Sherr asked, "Is this 14-year-old child a miracle worker, a messenger of God? Or is this all a cruel hoax, exploiting a sick and innocent girl?" Elsewhere a spokesman for the bishop confessed to having qualms about a disabled child being placed on public display. On one anniversary of Audrey's accident, she was exhibited at a Worcester stadium with some 10,000 people in attendance. At the Santo home a window was added to Audrey's bedroom through which pilgrims could stare at the "miracle" girl and pray for her to intercede with God on their behalf. (The window is reminiscent of one in a mobile-home carnival exhibit through which spectators could view "Siamese" twins as they watched TV.) However, the practice was discontinued by order of the bishop.

A picture of the Image of Guadalupe similar to this one is among the images that allegedly exude oil in the Santo home.

In preparing the *20/20* segment a producer called SKEPTICAL INQUIRER magazine and discussed with me the phenomenon of weeping icons. Of those that were not due to simple condensation or "sweating," I said, approximately 100 percent were fakes, judging by my experience. That includes oil-yielding icons, which typically involve a non-drying oil (like olive oil) that can stay fresh-looking indefinitely.

We discussed the possibility of using surveillance cameras to monitor the Santo statues, but I pointed out that if trickery were involved it was unlikely that such an investigative technique would be permitted. As Lynn Sherr would subsequently report on camera, "We wanted to do our own test with a surveillance camera in the [home] chapel, but the family prefers to let the commission finish its work first."

Unfortunately, the commission members seem woefully ill-prepared to investigate trickery. Sherr asked commission member Dr. John Madonna, "Did you see any way that anybody was pouring oil or making the oil appear on those objects?" He replied: "No. Especially after we did our examination behind the pictures and under the statues and so forth and found that there was no way that these objects were being fed the oil." Another member, Dr. Robert Ciotone, stated: "We found nothing, no source of the oil."

Actually, the conditions under which the statues and other objects yield oil are consistent with the surreptitious application of a non-drying oil. According to Sherr: "Although no one claims to have seen an object actually start to spout oil"—a very significant fact—"the commissioners were astounded when a reli-

gious icon they brought along oozed oil *that night." Of course no surveillance* cameras were monitoring the icon during that time.

On an episode of CBS's *48 Hours* titled "Desperate Measures" (1999), a reporter asked Linda Santo how one would know whether someone in the household was simply applying the oil "in the middle of the night." She replied, "You don't know." "Are you doing this?" Linda was asked. "No," she replied.

Linda Santo did permit *20/20* to take a sample of the oil. It proved to be 75 percent olive oil, "the rest unidentifiable," according to Sherr (1998). She added: "Other independent tests have all yielded different results—in other words nothing conclusive." In fact, analysis of one sample by a Pittsburgh laboratory revealed it to be 80 percent vegetable oil and 20 percent chicken fat, according to *The Washington Post*, which ordered the test (Weingarten 1998).

The commission's report, while noting that the source of the oil was not yet explained, did correctly conclude, "One cannot presume that the inability to explain something automatically makes it miraculous." (In other words, the commissioners were duly noting the logical fallacy of an argument *ad ignorantiam*—literally an appeal "to ignorance.") The report added, "We must be careful not to identify this oil as 'holy oil'"—that is, oil blessed by a Catholic priest and used to anoint the ill—and insisted it not be used or offered as such. Prior to this, the Santos distributed packets of oil-soaked cotton balls, often receiving money and other donations in return.

Taken together, the evidence relating to the oil exhudations raises strong suspicions. First, there is the lack of any *scientific proof for the alleged phenom*enon: not a single case of a weeping effigy has ever been scientifically verified. In fact the history of such reported occurrences is a litany of deception, including self-deception. In the Santo case there is no mere misperception, since the presence of copious amounts of oil—including the "spontaneous" filling of chalices—has been *well established. Moreover, the fact* that the oil has not been observed to flow strongly suggests prior application. And the varying test results seem less consistent with a genuine phenomenon than with an attempt to adulterate the oil in hopes of confounding the analysis. The presence of chicken fat—which, along with common vegetable oil, is readily available in a home kitchen—seems particularly telling. So does the observation of one volunteer that there tends to be an increase in oil on days pilgrims are expected ("Desperate" 1999).

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Even the timing of the phenomenon is suspicious, beginning long after Audrey's accident and following other traumas including her father's several-years desertion of the family and her mother's diagnosis of breast cancer. According to Lynn Sherr (1998), " . . . [J]ust as it seemed that God wasn't listening, the Santos believe he sent them a sign. With no warning and no logic, they say oil suddenly coated a religious portrait in their living room." This was a picture of the Image of Guadalupe—itself a faked "miracle" picture! (Nickell 1993, 29–34)—and it occurred after national media attention had focused on several other instances of "weeping" images.

The phenomena that accompany the Santo oil exhudations are also suspect, in part because cases of bogus weeping *images have often been attended by* other easily faked miracles (Nickell 1993). In this case there are "bleeding" pictures and communion wafers. Especially troubling are reports that stigmata—wounds imitating Jesus' crucifixion—have "mysteriously" appeared on Audrey's body, and on Good Fridays she has reportedly been seen to lie with her arms outstretched, as if crucified. *According to one reporter, "Her parents* say they cannot explain how their daughter, who cannot normally move herself, becomes positioned in this way" (Harrison 1998).

Although we live in a scientific age, there has been a resurgence in magical thinking, resulting in a revival of religious fundamentalism, the rise of the "New Age" movement, and an increase in "miracle" claims. The appeal is widespread, although it may be especially strong among the economically disadvantaged, where human despair and superstition may coexist. (The Santo phenomena, for example, take place in the midst of Portuguese immigrant families.)

People seem to hunger for some tangible religious experience, and wherever there is such profound want there is the opportunity for what may be called "pious fraud." Money is rarely the primary motive, the usual impetus being to seemingly triumph over adversity, renew the faith of believers, and confound the doubters. An end-justifies-the-means attitude may prevail, but the genuinely religious and the devoutly skeptical may agree on one thing, that the truth must serve as both the means and the end. Ultimately, neither science nor religion can be served by dishonesty.

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Sherr, Lynn. 1998. *The Miracle of Audrey. 20/20* (ABC News transcript no. 1848), October 4.

Weingarten, Gene. 1998. Tears for Audrey. *The Washington Post* July 19. □

Aliens Follow Their Leader

Steven Greer, M.D., is the leader of CSETI, a wild-and-woolly UFO group that claims to be able to lure spacecraft down for close encounters by shining lights at them. If that doesn't work, they try "coherent thought sequencing" (CTS), which apparently gets 'em every time—see www.cseti.org/member/kit_ad.htm for the whole story. (His Web site promises to reveal a "long history of communications from Mars." Unfortunately, that page is available only to paid members, so I will not be able to report on their exciting findings.) Greer claims to have had hundreds of close encounters. He claims to have seen a dozen spacecraft, clustered up in the stars in November 1998. As for seeing actual ETs themselves, that's much more rare: he's seen them only a couple dozen times. Greer recently moved from North Carolina to Charlottesville, Virginia, with alien activity, including crop circles, following closely in his wake. According to the *Charlottesville Weekly* (February 2), "Greer had just bought a house in Albemarle County when the circles appeared here." Greer noted that the crop circles were in the shape of the CSETI logo. "It was a welcome mat they—the extraterrestrials—put out for the director of CSETI," he modestly explained.

Greer is a big promoter of the gospel of reverse-engineered alien technology, first proclaimed in the book *The Day After Roswell* by the late Philip Corso. "We possess and have reverse-engineered functional extraterrestrial devices that operate with physics not being taught at UVA. I have seen them." But don't assume that Greer is naively credulous: he thinks that at least 90 percent of the claims of UFO abductions are "absolute rubbish or hoaxes." As for the rest, he thinks they are due to a military program using crafts that look like UFOs, in which people actually are abducted (which, incidentally, was the plot of a recent episode of *The X-Files*).

But a dynamic young Internet entrepreneur in California's Silicon Valley has eclipsed Greer in the race to get attention by making the most outrageous UFO claims. Joseph Firmage, 28, was founder and CEO of the highly successful U.S. Web Corporation (NASDAQ:USWB), founded just four years ago but now worth $2.8 billion. However, as Firmage told the San Jose *Metro*, his role has diminished from CEO to "founder and chief strategist" to "the guy at the end of the hall who believes in aliens." Like Saul of Tarsus, Firmage had his life altered forever by a vision; unlike Saul his vision didn't occur on the road to anywhere, but instead while lying in his bed. One morning upon awakening, "a remarkable being, clothed in brilliant white light, appeared hovering over my bed in my room. Out of him emerged an electric blue sphere, just smaller than a basketball, which was swirling with what looks like electrical arcs. It left his body, floated down, and entered me." After a brief conversation with the luminous entity, Firmage was convinced that aliens were real. Had he known more about psychology, he would never have embarrassed himself with this account: This is a classic "hypnopompic hallucination," well-known in psychology, and frequently cited in the serious literature dealing with supposed UFO abductions. (See, for example, Susan Blackmore, "Abduction by Aliens or Sleep Paralysis?" SI, May/June 1998). Halfway between the dream state and waking, the mind mixes the input it receives from both.

Firmage used $3 million of his own money to found the International Space Sciences Organization in Santa Clara. He now accepts, and promotes, the most outlandish UFO claims making the rounds. Like Greer, Firmage preaches that most of our newest high-technology wonders, such as fiber optics, were reverse-engineered from artifacts found in a crashed saucer in Roswell, New Mexico, which is surely among the most absurd and ironic statements ever made by a Silicon Valley insider. When informed of this, Dr. Narinder Kapany, who developed the

Robert Sheaffer's World Wide Web page for UFOs and other skeptical subjects is at www.debunker.com.

first fiber optics in the 1950s, exclaimed "that makes me a spaceman!" He explained how his interest in bending light around corners began when he was a student in India during the 1940s.

One of Firmage's favorite "proofs" is the disputed MJ-12 papers claiming that a secret government cabal keeps the lid on extraterrestrial encounters, milking them for information while hiding them from the public. The supposed Majestic 12 papers first surfaced in 1986 and have been extensively studied (and refuted) since then. Many of the more cautious UFO believers agree that they are hoaxes, including Roswell-crash promoter Kevin Randle. As if these papers were not sufficiently suspect, Firmage relies heavily on a *second* set of MJ-12 papers, whose credibility problems are even more apparent than those of the first and whose supporters are even fewer. Yet Firmage apparently expects people to accept the "new" MJ-12 papers as proof of a giant government conspiracy, even though the originals have been shown to a hoax. You can read all these "proofs" for yourself at Firmage's Web site, modestly titled The Truth at www.thewordistruth.org. (He requires you to give him your e-mail address before allowing you to tap into his fount of cosmic wisdom.)

Firmage was confident that the publication of his twaddle would convince all and sundry who happened to read it, and burst open the dam of UFO secrets. Apparently he does not realize that "selling" far-out stories to the scientific community is not as easy as "selling" a hot Silicon Valley Internet company to eager Wall Street investors. The scenario he envisioned was that "every week for the next two months [after his publication last December] people with information will be emboldened to come forward." This failed to happen, most likely because there isn't anybody in possession of the kind of UFO-conspiracy information he was hoping to find.

A new "documentary," "UFOs: Testing the Evidence" in which I briefly appeared, was shown on the A&E Channel on April 8, 1999. Hosted by Bill Curtis, its main focus was the March 12, 1977, incident in which Captain Neil Daniels reported that his United Airlines Flight 94 was apparently "diverted" for a short time under the control of a brilliant light that appeared in the sky to the west. Unfortunately, the show's writers chose to completely ignore the prosaic explanation I gave them. The supposed navigational anomaly occurred just after the navigator had switched over to a new directional beacon, which opens up many opportunities for the aircraft to suddenly change direction. Whether the navigational anomaly was caused by a mechanical problem or by human error, the appearance (and disappearance) of the brilliant light reported by Captain Daniels matches precisely with the known position of the brilliant planet Venus setting in the west, a fact pointed out to me by skeptic Tim Printy (see his Web page at http://members.aol.com/TPrinty/UFO.html). Apparently the show's directors didn't want to spoil a really exciting UFO story by letting mere facts get in the way.

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In spite of all the hysterical promotion by the media, the past year has not been a good one for classic UFO cases. The famous pair of UFO photos taken by the Lucci brothers in Beaver County, Pennsylvania, in 1965 have been among the most recognizable anywhere. It is one of the major cases presented in John Fuller's *Incident at Exeter*, and featured on the cover of his book *The Interrupted Journey*. According to the boys, they photographed a giant UFO that they saw hovering near the moon. The photos were soundly endorsed by "experts," even though they look remarkably like a plate resting on somebody's hand (which is exactly what William K. Hartmann, writing in the Condon Report, concluded that they were). Fuller quotes one professional photographer saying, "if somebody asked us to go out and duplicate this picture, we would find it impossible."

However, the Winter 1998 issue of *International UFO Reporter*, published by the Center for UFO Studies, contains an article by Mark Cashman titled "The End of a Photographic Case." Researching the venerable classic case, Cashman traced down John Lucci, the elder brother, twenty years old in 1965 but now fifty-three. After some hesitation, Lucci confessed that he, his brother, and another youth had faked the photo more than thirty years earlier, "largely as described by the Condon report" (which, incidentally, is now online, thanks to the National Capital Area Skeptics. See www.ncas.org). The boys intended only to fool one of their friends with the photo. However, that friend took it to the local newspaper, and "things got out of hand quickly . . . before they knew it, the picture was famous." Continues Cashman: "what may surprise people is how much of a burden this was to the two claimants. They were greatly relieved to get this settled. Other hoaxers may be similarly burdened, and we need to be able to give them a way to own up to the truth." He notes how solid the photos' reputation had once been, soberly concluding that "this must bring home to us how fragile some apparently reliable information may be." I predict that if Mr. Cashman continues to do first-rate investigative work like this, he will soon have few friends left within the UFO movement. □

Where Do We Come From?

A Humbling Look at the Biology of Life's Origin

The origin of life on Earth is a fundamental scientific question, but we do not know as much as many biology textbooks would like you to believe.

MASSIMO PIGLIUCCI

Science is about answering questions regarding the natural world in a rational, evidence-based manner. One commonly accepted component of the scientific method is repeatability of the phenomena under investigation. Here lies perhaps the most difficult aspect of the quest for knowledge of the origin of life on Earth. It is clearly a question about the natural world, in fact perhaps one of the ultimate questions (together with the origin of the universe itself). Yet the events we are attempting to investigate are by definition unique. Life may well have originated multiple times in the universe, including perhaps in our galactic neighborhood. But at the moment we only have one example to go by. Earth is the only place that we know for

certain harbors life as we conceive it.

Before entering into a skeptical evaluation of the heart of the problem, let us answer an even more fundamental question: Why do we care? I suggest two reasons. First, should we arrive at the conclusion that life originated elsewhere in the universe and was then somehow "imported" to Earth, this would automatically imply the existence of life as a widespread phenomenon in the cosmos, and therefore the fact that living beings are not unique to our planet; it is hard to conceive of a more compelling blow to anthropocentrism since Copernicus and Galileo swept Earth away from the center of the universe a few centuries ago. Second, and perhaps more relevant, humankind would finally have an answer to the question "where did we come from?" which, like it or not, has been vexing our philosophy, art, and science since the beginning of recorded history (and probably much earlier than that). If that doesn't sound to you like enough of a reason to ponder the controversy over the origin of life, your curiosity-neurons are definitely in need of some therapy.

Couldn't We Just Look at the Simplest Organism?

Before we begin to discuss the varied theories about the origin of life, let us clear the field from one misconception. There is no such thing as a modern-day "primitive" organism that we can examine to tell what our earliest ancestors looked like. True, there are plenty of "simple" organisms around today, from viruses to bacteria to slime molds. But slime molds are in fact eukaryotes, i.e., their cellular structure and metabolism are basically similar to those of an animal or a plant. They are far too complex for our purposes. Bacteria are prokaryotes, that is, their cells are indeed simpler than those of most other living organisms. But bacteria have been around for more than three billion years, and they have become perfect reproductive machines, characterized by an incredibly efficient metabolism and ability to withstand environmental changes. After all, it is not by chance that they have proliferated for so long. So that answer is unsuitable as well. Finally, viruses are indeed among the simplest living creatures in existence, so simple in fact that some biologists even doubt that they really qualify as "living." But evolutionarily speaking, viruses are late arrivals on the Darwinian stage. Viruses are short pieces of nucleic acids wrapped in a protein. They originated from pre-existing nucleic acids, live only inside cells, and depend entirely on the host's metabolism to reproduce. Quite obviously, since our problem is to understand how the *first* living organisms came about, we cannot utilize as a model something that cannot survive outside an already existing cell. No, we are looking for something simple, yes, but self-sufficient, and *really* primitive.

Top ten classical readings on the origin of life

A.I. Oparin, 1938. *The origin of life on Earth.* Macmillan. Oparin's pioneering suggestions about the first steps of life and the role of coacervates in forming the first cells.

E. Schrodinger, 1947. *What is life?* Macmillan. The first physicist who had a brilliant idea about the answer to the ultimate question.

S.L. Miller, 1953. "A production of amino acids under possible primitive earth conditions." *Science* 117:528–529. The original article on how to make the soup.

S.W. Fox, 1960. "How did life begin?" *Science* 132:200–208. Although his theory of proteinoid microspheres as the precursors of modern cells is hard to believe, it is still cited in modern textbooks.

F. Hoyle and C. Wickramasinghe, 1978. *Lifecloud.* Harper and Row. All about Hoyle and Wickramasinghe's interstellar theories. Turn your skeptic sense very high!

D. Gish, 1979. *Evolution? The fossils say no!* Creation-Life Publishers. If you really want to know prima facie what the creationists say.

F. Crick, 1981. *Life itself.* Simon and Schuster. The eclectic Nobel laureate's offbeat take on the origin question.

A.G. Cairn-Smith, 1985. *Seven clues to the origin of life.* Cambridge University Press. For the aficionados of the clay theory.

J.B.S. Haldane, 1985. "The origin of life," in *On being the right size and other essays,* Oxford University Press. The original soup can be found here (note that this is a reprint of a much older article).

R. Shapiro, 1986. *Origins: A skeptic's guide to the creation of life on Earth.* Summit. Expressly for skeptics!

The Alternative Answer: What About God?

No serious scientific discussion of any topic should include supernatural explanations, since the basic (and very reasonable) assumption of science is that the world can be explained entirely in physical terms, without recourse to divine entities. However, as Sherlock Holmes said, "When you have eliminated the impossible, whatever remains, *however improbable,* must be the truth" (in Arthur Conan Doyle's *The Sign of Four*). So, should it turn out that we really do not have a clue about the origin of life, we must entertain other, more esoteric possibilities.

Furthermore, in the specific case of the origin of life, even such scientists as the British astrophysicist Fred Hoyle have gone on record precisely suggesting a supernatural beginning to all life on Earth. Hoyle, together with his colleague Chandra Wickramasinghe, suggested that a sort of silicon-chip creator actually goes around the universe sprinkling the seeds of life here and there. An alternative scenario is the one advanced by creationists such as Duane Gish. In Gish's case, of course, we have the classical God of the Bible, who created the universe and humankind with a very personal touch, and did so in the span of only six days. Let me make clear that a rejection or falsification (to the extent that it is possible) of these hypotheses does not prove the nonexistence of every God, which in and of itself is outside the realm not only of science, but of any human enterprise. However, modern science is certainly in a position to reject specific hypotheses about special creation. Namely, Gish's contention of a 6,000-year-old Earth is out of the question given what we know about the geology

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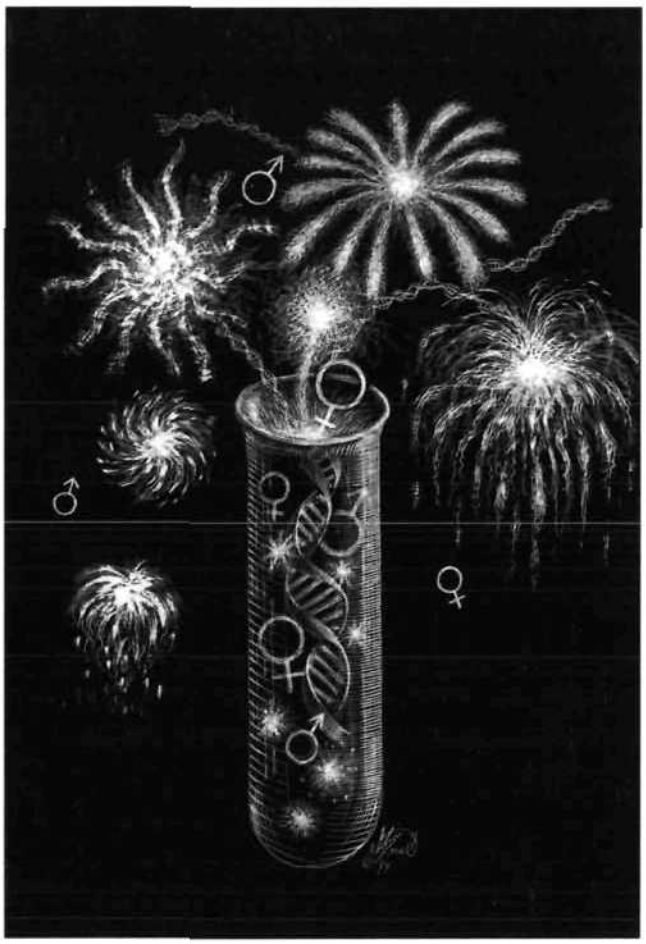
and geophysics of planetary evolution.

Should a skeptic reject outright any possibility of special creation of life? Well, no. Although implausible, it is still possible. There are two points that must be borne in mind, however, before going for a Hoyle-like explanation of the origin of us all. First, it has to be true that we really don't have a clue about how life *on Earth* originated by natural means. As we will see, though the situation is messy, it is not that desperate. Second, the mere fact that we cannot currently (or even ever) explain something does not constitute *positive* evidence for a supernatural explanation. After all, for a long time we did not know what natural phenomena could cause lightning, but eventually theories based on Zeus's anger did turn out to be incorrect. Consequently, it may be that the only rational position for the time being is simply a provisional and salutary "I don't know."


Gerald Fried

Out of This World?

The next class of explanations about the ultimate provenance of life is that—as any good old-fashioned science fiction movie of the 1950s would have proclaimed—it is not of this world. Interestingly, Hoyle and Wickramasinghe have made their contribution in this realm too, by suggesting that life was brought to this planet courtesy of an interstellar cloud of gas and dust, or perhaps by a comet. Yet another British scientist (and also an ex-physicist—coincidence?), the Nobel laureate Francis Crick, joined the ranks of the extraterrestrialists. Crick suggested a scenario that envisions extraterrestrial beings "seeding" the galaxy, much in the same fashion of Hoyle's silicon-chip creator.

Contrary to the supernatural explanations, the Hoyle-Wickramasinghe theory (but not Crick's) is at least in principle open to experimental verification, in that it makes some relatively precise predictions. For one thing, we should find plenty of organic compounds in interstellar clouds, inside comets, or both. Both these expectations have been superficially verified. I say superficially because the kind of compounds found by astronomers in these media are very simple, much too simple to provide any meaningful "seed" for the origin of carbon-based life forms on Earth. Furthermore, extraterrestrial organic compounds have random chirality, unlike the organic compounds typical of living organisms. Chirality is a property of any chemical structure that deals with the three-dimensional arrangement of its atoms and molecules. All amino acids, for example, the building blocks of proteins, can in theory come in two versions, which are mirror images of each other. These are called "left-" and "right-" handed forms, and they are characterized by exactly the same chemical properties. The biomolecules used by terrestrial organisms, however, are either left- or right-handed (depending on the type of molecule). If indeed life had come from space, one would expect to find a similar chiral asymmetry in space matter as well.

A second crucial objection to the life-from-space hypothesis is posed by its violation of the principle of uniformitarianism. If comets and meteors brought us—literally—to Earth a few billion years ago, why are they not doing it now? Meteors continue to bombard our planet and our neighbors in the solar system on a regular basis, yet so far not a single living organism or complex organic molecule has been found inside any of them. There is no reason to think that the primordial "shower of life" has ceased. Even though the conditions for the persistence of primordial life on our planet may no longer hold, presumably the space surrounding our solar system has not changed that much, leaving Hoyle, Crick, and others with a major hole in their arguments.

Finally, it has to be realized that even if we do admit that life originated outside Earth and was then imported here, we really would not have an answer to *how* life started. We would have simply shifted the question to a remote and very likely inaccessible realm, an intellectually unsatisfactory state of affairs.

The Chicken or the Egg in the Soup?

Having excluded—at least temporarily—Gods and extraterrestrials, we are left with plain old biochemistry and biology to give us clues to the origin of life. The history of scientific research in this field is long and fascinating. It started in the 1920s with the Russian scientist Alexander Oparin and his "coacervates," blobs of organic matter (mostly containing sugars and short polypeptides), supposedly the precursors of mod-

ern cells. It was Oparin, together with the British biologist J.B.S. Haldane, who came up with the idea of a "primordial soup"—the possibility that the ancient oceans on Earth were filled with organic matter formed by the interaction between the atmospheric gases and energy provided by volcanic eruptions, powerful electric storms, and solar ultraviolet radiation.

Science had to wait until the 1950s for Stanley Miller to actually attempt to experimentally reproduce the soup. The story is well known: Miller started with a reasonable facsimile of the ancient atmosphere, mostly methane and ammonia, with no oxygen. Atmospheric oxygen, together with the ozone that blocks ultraviolet radiation, was in fact produced much later by the organic process of photosynthesis in blue-green algae (however, more recent research has suggested the presence of some oxygen in the original atmosphere). Miller put the whole thing in a ball, gave it an electric charge, and waited. He found that amino acids and other fundamental complex organic molecules were accumulating at the bottom of his apparatus. His discovery gave a huge boost to the scientific investigation of the origin of life. Indeed, for some time it seemed like creation of life in a test tube was within reach of experimental science. Unfortunately, such experiments have not progressed much further than their original prototype, leaving us with a sour aftertaste from the primordial soup.

Oparin and Miller, as well as other early researchers such as Sidney Fox, thought that the problem was how to explain the appearance of proteins, since they must have caused the initial spark of life. As any student of introductory biology knows, however, there are *two* major players inside every living cell: proteins and nucleic acids (such as DNA and RNA). The problem is that the structure of DNA was discovered only in 1953 (in fact, the same year of Miller's experiment), and the nature of DNA as the information carrier of the cell was little appreciated before James Watson and Francis Crick unveiled the double-helix nature of this remarkable molecule.

As a consequence of the new discoveries, the origin of life debate after the 1950s was decidedly slanted in favor of nucleic acids preceding proteins. The new discipline of molecular biology was making spectacular progress, uncovering the universal code by which the instructions for making proteins are embedded in the nucleic acids. Scientists such as Leslie Orgel, Walter Gilbert, and others therefore proposed that the egg, so to speak, came before the chicken. Some sort of primitive nucleic acid had appeared first, followed only later by proteins.

Many pathways for origin of life

For those who are studying the origin of life, the question is no longer whether life could have originated by chemical processes involving nonbiological components. The question instead has become which of many pathways might have been followed to produce the first cells.

— *Science and Creationism: A View from the National Academy of Sciences*, 2nd ed., National Academy Press, Washington, D.C., 1999.

In today's biochemically sophisticated cells, proteins and nucleic acids play very distinct roles. Four such fundamental activities need to be summarized for our purposes.

1. The DNA (deoxyribonucleic acid) encodes the information that eventually gives rise to proteins.

2. The messenger RNA (or mRNA, ribonucleic acid, the same as DNA, but with an extra oxygen atom and a few other chemical differences) then carries the information to specialized structures known as ribosomes.

3. Inside the ribosomes (which, by the way, are made of both nucleic acids and proteins) the message gets translated into proteins by virtue of a second type of RNA, known as transfer RNA (tRNA). The tRNA has the peculiar ability to attach itself to the mRNA on one side and to amino acids (the blocks that make up proteins) on the other side. This way, we have a chain of mRNA that is paralleled by the forming chain of amino acids that in turn will eventually result in the final protein.

4. The proteins, most of which are enzymes, are the actual "doers" of the cellular world. They are both the building blocks of cell structures and membranes, and the builders themselves, in the form of enzymes capable of catalyzing all sorts of chemical reactions. This includes the replication of DNA and the transcription of its message into RNA—which, of course, closes the nucleic acid-protein circle.

It's clear from the above description that we are facing a classic chicken-and-egg problem. If the proteins appeared first, so that they could eventually catalyze the formation of nucleic acids, how was the information necessary to produce the proteins themselves coded? On the other hand, if nucleic acids came first, thereby embodying the information necessary to obtain proteins, how were the acids replicated and translated into proteins? It seems clear to me that the answer, although nebulous at the moment, must lie in the proverbial middle. In fact, the existence of tRNAs points to the distinct possibility of dual structures, containing both RNA and amino acids. Furthermore, the discovery by Sydney Altman, Thomas Cech, and others that some RNAs are at least partially self-catalytic (i.e., they can catalyze chemical reactions onto themselves), lends further support to the idea of a mixed origin of life. The original molecules may have been both replicators and enzymes, with the two functions slowly diverging through evolutionary time and later assigned to distinct classes of molecules. Such a Solomonic solution appeals to our sense of aesthetics as well.

And Then What? Hypercycles and Emerging Properties

I submit that the problem of how complex organic compounds might have formed on the primordial Earth has been satisfactorily solved by Miller-type experiments (which yield similar results under a wide variety of simulated atmospheric conditions). Furthermore, there are good reasons to believe

that the initial complex molecules that underwent chemical evolution were some sort of nucleic acid-protein mix such as modern-day tRNAs. But what happened after that? There is still a very large gap between a semi-catalytic, semi-replicating nucleo-protein and the first living "organism," whatever form that may have assumed.

And the exact form seems to be part of the problem. What exactly *is* life? Physicist Erwin Schrodinger asked that question precisely in such fashion in 1947. While Schrodinger's thinking led him to predict some of the properties of DNA as a necessary component of a living organism, we still have only a vague notion of the boundary between life and inert matter. And so it *should* be, if we accept the idea that living organisms are made of inert matter that happens to acquire some "emergent properties" when it is assembled in particular ways. To put it another way, living beings are *not* separated from the rest of the universe by some mysterious force or vital energy.

How then do we know what is life and what is not? We can derive a list of attributes, some of which can be properties also of non-living systems, but with the ensemble defining a living organism:

- Ability to replicate, giving origin to similar kinds (*reproduction*)
- Ability to react to changes in the environment (*behavior*, not just limited to the special meaning that the word has in animals)
- *Growth* (i.e., reduction of internal entropy at the expense of environmental entropy—note that even single cells grow immediately after reproduction, so this is not a property restricted to multicellular life)
- *Metabolism* (i.e., capacity of maintaining lower internal entropy, including the ability of self-repair)

How did we get from a nucleo-protein to an entity capable of all of the above? And what did this entity (sometimes known as the "progenote") look like? There are very few even tentative answers to these questions, and this—I think—is where the real problem of the origin of life lies. The German scientist Manfred Eigen has proposed a possible scenario that invokes what he called "hypercycles." We can think of a hypercycle as a primitive biochemical pathway, made up of self-replicating nucleic acids and semi-catalytic proteins that happen to be found together in pockets within the primordial soup. It is possible to imagine that some of these hypercycles are made of elements that "cooperate" with each other, i.e., the product of a component of the cycle can serve as the substrate for another. Different hypercycles could have coexisted before the origin of life, and they would have competed for the ever-decreasing resources within the soup (the resources were decreasing because the hypercycles were using up some organic compounds at a higher rate than they were formed by comparatively inefficient inorganic processes). Eventually, this competition would have favored more and more efficient hypercycles, where the "efficiency" would be measured by the ability of these entities to survive and reproduce, that is by the parameters of Darwinian evolution. Life as we know it (sort of) would have begun.

Eigen and modern followers of complexity theory also expect these systems to become more complicated with the

Top ten contemporary readings on the origin of life

B.E.H. Maden, 1995. "No soup for starters? Autotrophy and the origins of metabolism." *Trends in Biochemistry* 20:337–341. A short review of recent alternatives to the soup based on the clay hypothesis, i.e., on an initial biochemistry without either enzymes or nucleic acids.

E. Stackebrandt and F.A. Rainey, 1995. "Partial and complete 16S rDNA sequences, their use in generation of 16S rDNA phylogenetic trees and their implications in molecular ecological studies." *Molecular Microbial Ecology Manual*, edited by A.D.L. Akkermans, J.D. Van Elsas, and F.J. De Bruijn. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 1–17. Though not directly related to our main topic, this article summarizes how molecular biologists can use and compare currently existing sequences of DNA to infer a wealth of information on a wide range of biological phenomena, including clues to the first stages of biological evolution on the planet.

G. Ertem and J.P. Ferris, 1996. "Synthesis of RNA oligomers on heterogeneous templates." *Nature* 379:238–240. A technical discussion of what kind of self-catalytic RNA one can expect to form in the soup.

P. Forterre, 1996. "A hot topic: the origin of hyperthermophiles." *Cell* 85: 789–792. Hyperthemophiles are bacteria that live under very high temperatures (up to 110°C). They are by all accounts the most ancient form of life still with us. The article discusses their biology as well as how much light (if any) they shed on the possibility that life arose under hot, non-soup-like conditions.

A. Laczano and S.L. Miller, 1996. "The origin and early evolution of life: prebiotic chemistry, the pre-RNA world, and time." *Cell* 85:793–798. A review of recent advances in the field by one of the originators of the modern scientific investigation into the problem (Miller, that is).

D.H. Lee, J.R. Granja, J.A. Martinez, K. Severin, and M.R. Ghadiri, 1996. "A self-replicating peptide," *Nature* 382:525–528. This article reports the discovery of what was thought until recently impossible: a self-replicating protein! Together with the earlier discovery of self-replicating RNA, this really re-opens the entire chicken-and-egg question.

E. Melendez-Hevia, T.G. Waddell, and M. Cascante, 1996. "The puzzle of the Krebs citric acid cycle: assembling the pieces of chemically feasible reactions, and opportunism in the design of metabolic pathways during evolution." *Journal of Molecular Evolution* 43:293–303. By examining the possible evolution of one of the biochemical cycles common to all living beings, the authors propose a general theory of how biochemical reactions could get increasingly complex during evolutionary time.

S. Lifson, 1997. "On the crucial stages in the origin of animate matter." *Journal of Molecular Evolution* 44:1–8. A discussion of what successive stages might have led from inanimate to animate matter. Natural selection, first at the chemical then at the biological level, is hypothesized to have played a pivotal role from the beginning.

S.L. Miller, 1997. "Peptide nucleic acids and prebiotic chemistry." *Natural Structural Biology* 4:167. Miller's recent defense of a mixed origin (nucleic acid-proteins) model for the origin of life.

M.R. Edwards, 1998. "From a soup or a seed? Pyritic metabolic complexes in the origin of life." *Trends in Ecology and Evolution*, 13(5):178–181. An exploration of a mineral alternative to the soup.

addition of new components to the cycle. From time to time, the addition of one component would modify the whole system dramatically, giving it properties that the previous group did not possess (sort of like adding an atom of oxygen to two of hydrogen and suddenly getting something completely distinct and more complex: water). Complexity theorists such as Stuart Kauffman and Christopher Langton have demonstrated, on the basis of mathematical models, that some self-replicating systems can display unexpectedly complex patterns of behavior. The textbook example of this phenomenon is the so-called cellular automata, mathematical entities first imagined by John von Neumann in 1940 and that can now be studied at leisure by anybody who has a personal computer and a copy of a game aptly called "Life."

The general path leading to the origination of life seems to have been something like this:

1. *Primordial soup* (simple organic compounds formed from atmospheric gases with the aid of various sources of energy)

Top ten Web sites on the origin of life

http://users.aol.com/chinlin3/home.htm
A page devoted to the astronomical, chemical, and biological aspects of the problem.

http://eis.jpl.nasa.gov/origins/index2.html
This is NASA's "Origins" program page. It deals with much more than the origin of life on Earth, including the existence of other solar systems and the very birth of the universe.

http://www.panspermia.org/
Devoted to the panspermia theory (life imported from outer space). It includes discussions of neodarwinism and of philosophical aspects of the origin of life question. Nice pictures.

http://www.seti.org/seti-top.html
The page of SETI (Search for Extra-Terrestrial Intelligence). Lots of educational material, bibliographic references, and links. There is even a gift shop!

http://www.sigmaxi.org/amsci/articles/95articles/cdeduve.html
An article on the origin of life published in the electronic version of *American Scientist*, a magazine worth checking out in and of itself.

http://www.exobiology.nasa.gov/
The very cool NASA site on exobiology (the study of life outside our planet).

http://www.chron.com/content/interactive/space/news/mars/
Devoted to the red planet and the possibility of life on it. Extensive links and NASA press releases.

http://bolero.gsfc.nasa.gov/~odenwald/ask/alife.html
A cute NASA Question and Answer page on life in the universe, its origin, and its evolution.

http://www.sciam.com/askexpert/biology/biology15.html
A "*Scientific American*—Ask the Experts" site where James Ferris of the Rensselaer Polytechnic Institute in Troy, New York, gives concise but up-to-date information on what we know about the origin of life. Some good links provided.

http://www.santafe.edu/sfi/publications/Bulletins/bulletinsummer97/turning.html
An article from the controversial but stimulating Santa Fe Institute, devoted to research on complexity theory. It deals with Mars and self-replicating proteins.

2. *Nucleo-proteins* (similar to modern tRNAs)

3. *Hypercycles* (primitive and inefficient pathways, emergent properties)

4. *Cellular hypercycles* (more complex cycles, eventually enclosed in a primitive cell made of lipids)

5. *Progenote* (first self-replicating, metabolizing cell, possibly made of RNA and proteins, with DNA entering the picture later on)

How plausible is all this? It certainly is conceivable from the standpoint of modern biology. The problem is that each step is difficult to describe in detail from a theoretical standpoint, and so far (with the exception of the formation of organic molecules in the soup) has proven remarkably elusive from an empirical perspective. It looks like we have several clues, but the overall puzzle is proving to be one of the most difficult for scientific analysis to solve. The chief reason for such difficulty could be—as I mentioned earlier—that all we have is one example to go by. Or it may simply be that the events in question are so far remote in time that there is very little we can be certain about, making any attempt at empirical investigation hopelessly vague. Consider that the fossil record shows completely formed, "modern-looking" bacterial cells a few hundred million years after the formation of Earth—about 3.5 billion years ago. This tells us that whatever happened before that happened quickly, but there is no record of it. Finally, it could very well be that we are missing something fundamental here. It may be that the study of the origin of life has not yet seen its Einstein or Darwin, and that things are going to change just around the corner, or never.

From Dust to Dust . . .

A contemporary discussion of the question of the origin of life cannot be complete without the inclusion of A.G. Cairns-Smith's theory of clay crystals. I hope this will not be the case for much longer (except as a footnote of historical value). Don't get me wrong, I am familiar with Cairns-Smith's research and writing, and I find it excellent. But everybody can make a mistake, and I think the clay theory clearly falls within the cracks of Cairns-Smith's career, as ingenious and superficially enticing as it may be.

Briefly, the idea is that life didn't originate with *either* nucleic acids *or* proteins. The original replicators and catalyzing agents were actually crystals found everywhere in the clay that lay around the primitive Earth. There are four cardinal points of Cairn-Smith's hypothesis. First, crystals are structurally much simpler than any biologically relevant organic molecule. Second, crystals grow and reproduce (i.e., they can break because of mechanical forces, and each resulting part continues to "grow"). Third, crystals carry information and this information can be modified. A crystal is a highly regular structure, which tends to propagate itself (therefore, it carries information). Furthermore, the crystal can incorporate impurities while it's growing. These impurities alter the crystal's structure and can be "inherited" when the original piece breaks (hence, the information can be modified). Fourth, crystals have some minimum capacity of catalyzing (i.e., accelerating)

chemical reactions.

Cairns-Smith then proposed that these very primitive "organisms" started incorporating short polypeptides (proto-proteins) found in the environment—presumably in the soup—because they enhanced the crystals' catalyzing abilities. The road was suddenly open for an increase in the importance of proteins first, and then eventually of nucleic acids, until these two late arrivals on the evolutionary scene completely supplanted their "low-tech" progenitor, and gave origin to the living organisms that we know today.

What is wrong with this picture? First of all, Cairns-Smith seems to completely ignore what a living organism is to begin with. For one thing, crystals don't really have a metabolism, not in the sense defined above for living organisms. The reason for this may have something to do with the fact that not only are crystals structurally much less complex than a protein or a nucleic acid, but also with their silicon-based chemistry, recognizably much simpler than the carbon-based chemistry utilized by living organisms on Earth. The lower complexity and simpler chemistry may be insurmountable "hardware" obstacles to the origination of a true metabolism in clay matter. Second, crystals don't really react to their environment either, another hallmark of every known living creature. Notice that this is a property distinct from metabolism, in that metabolism can be entirely internal, with no reference to the outside world (except for some flux of energy that must come into the organism to maintain its metabolism). On the other hand, living organisms universally and actively respond to changes in external conditions, for example by seeking sources of energy or by avoiding dangers. Furthermore, an argument can be made that crystals are not actually capable of incorporating new information in their inherited "code," unlike what happens with mutations in living beings. True, they can assimilate impurities from the environment and "transmit" such "information" to their "descendants" for some time; but these impurities do not get replicated, they need continually to be imported from the outside, and they do not become a permanent and heritable part of the crystal. Moreover, impurities do not create new types of crystals, the way mutations give rise to entirely new kinds of animals and plants.

Another colossal hole in the clay theory is—of course—that we have no clue to how the "mutiny" of nucleic acids and proteins actually occurred, and in fact we are given very faint hints about how a crystal could possibly co-opt a polypeptide to enhance its growth. Therefore, as much as creationists might like the flavor of a theory of the origin of life in which the first living beings came literally from dust (although Cairns-Smith is certainly no creationist), we're still left with ribonucleo-proteins as our best, albeit fuzzy, option. The origin of life is one question that science will be pondering for some time to come, and skeptics should be wary of oversimplified answers found in introductory biology textbooks.

Acknowledgments

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Profits and Prophecy
Hayseed Stevens and Oil in Israel

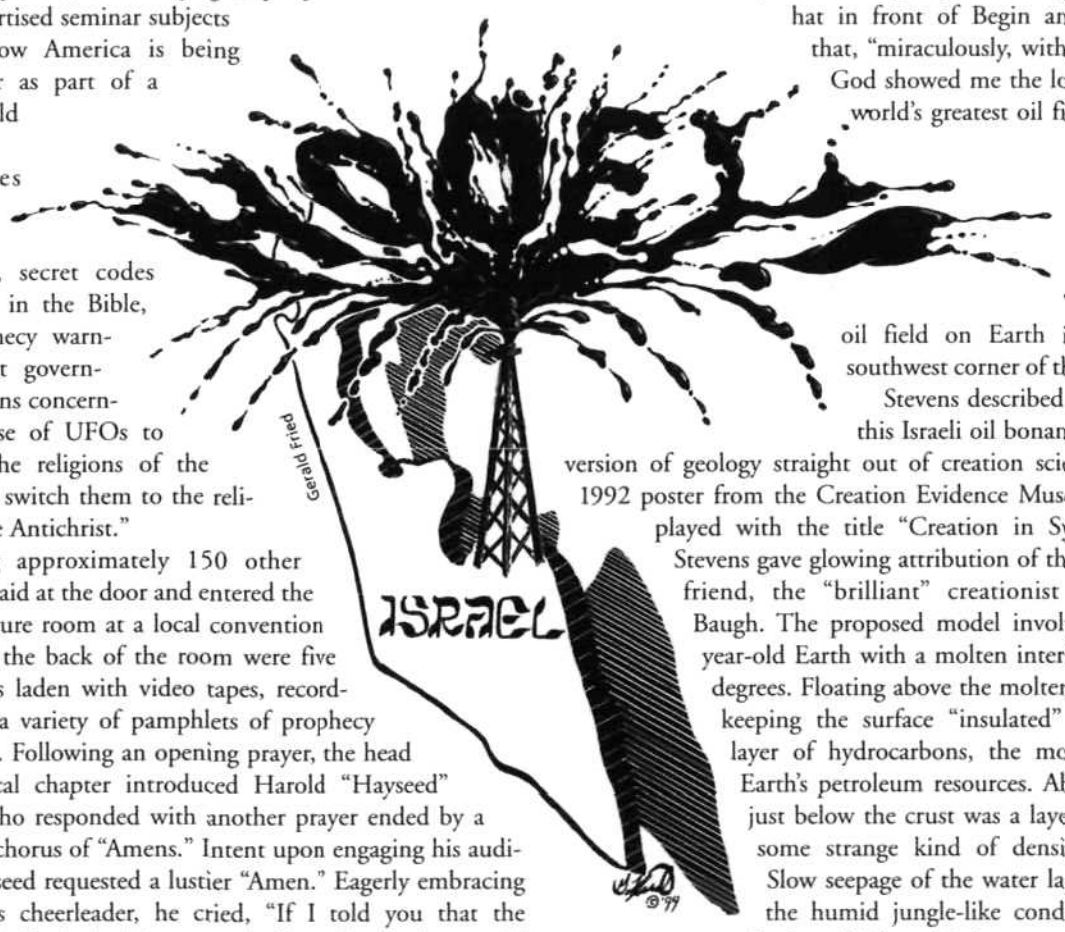
A fundamentalist oil entrepreneur mixes creation science, Biblical prophecy, and revivalist techniques for a program of oil exploration in Israel.

DONALD U. WISE

When the local Pennsylvania newspaper announced that the Prophecy Club would be holding a three-hour seminar conducted by "Hayseed" Stevens concerning prophecy and oil in Israel, curiosity overwhelmed me. After a forty-year career of research and geology teaching, I had a fair idea of Israel's geology and the origin of its tiny oil production. Such a case for personal "enlightenment" was not to be missed. The following report on that January 8, 1998, seminar is a small window on the fundamentalist movement in America and its application of creation science.

The Prophecy Club has a network of local chapters, with its headquarters in Topeka, Kansas. It is a fundamentalist

Christian organization with television programs scheduled on eight stations. It also has radio programs on fifty-eight AM and FM stations and six shortwave stations as well as on six satellite channels. Its January/February 1998 newsletter, distributed at the seminar, lists a total of "765 new conversions" and "2,441 rededications" during the last year as "determined by show of hands and public confessions at its sessions." This particular presentation was one of twelve being made from Boston to Spokane by "Hayseed" Stevens in January and February 1998. The newsletter lists fifty additional seminars to be taught across the nation by four other speakers during this same time period, each charging $7 per person admission. Advertised seminar subjects include how America is being taken over as part of a "New World Order," prophecies of financial crisis, secret codes embedded in the Bible, and prophecy warnings about governmental plans concerning the use of UFOs to "destroy the religions of the world and switch them to the religion of the Antichrist."



Joining approximately 150 other people, I paid at the door and entered the rented lecture room at a local convention center. At the back of the room were five sales tables laden with video tapes, recordings, and a variety of pamphlets of prophecy and doom. Following an opening prayer, the head of the local chapter introduced Harold "Hayseed" Stevens, who responded with another prayer ended by a lackluster chorus of "Amens." Intent upon engaging his audience, Hayseed requested a lustier "Amen." Eagerly embracing his role as cheerleader, he cried, "If I told you that the Philadelphia Eagles had just won the Super Bowl, what would you say?" "Amen!" "Even better. Now what if I told you that Jesus Christ was coming tomorrow?" A thunderous "Amen!" followed. After finally warming up his audience, Stevens directed the group to repeat after him, "The greatest oil field on Earth is under the southwest corner of the Dead Sea." Throughout the rest of the talk, at about ten minute intervals, he led his audience in this same rousing cheer.

Now, with an involved and receptive audience, Stevens proceeded to describe his early fundamentalist religious life growing up on a sharecrop farm in Texas, his sinful life as a professional football player, and his final conversion to Christian evangelism. According to his tale, one day God told him to go into the oil business. With God's direction he developed Hayseed Stevens Oil, Inc., as well as an international oil company called Ness Energy International. After a few years, God told him to go drill for oil in Israel and He would reveal the oil's location.

Stevens described going to Israel in 1980 with eleven other Christian businessmen to meet with Menachem Begin. When Begin told them that he knew nothing about oil, Hayseed whipped off his Texas-style ten gallon hat and gave it to Begin announcing that the gift would help him understand the oil business. At once, the miracle occurred! The hat fit and Begin said to him, "Maybe you should be the one to come and find oil for us in Israel." As proof that such an event took place, Stevens showed a photo of the group with a big white Texas hat in front of Begin and concluded that, "miraculously, within two hours God showed me the location of the world's greatest oil field. . . . Now repeat after me . . ." And the crowd thundered, "The greatest oil field on Earth is under the southwest corner of the Dead Sea."

Stevens described the origin of this Israeli oil bonanza by using a version of geology straight out of creation science. A large 1992 poster from the Creation Evidence Museum was displayed with the title "Creation in Symphony" as Stevens gave glowing attribution of the work to his friend, the "brilliant" creationist writer Carl Baugh. The proposed model involved a 6,000-year-old Earth with a molten interior at 10,000 degrees. Floating above the molten interior and keeping the surface "insulated" was a huge layer of hydrocarbons, the mother lode of Earth's petroleum resources. Above this and just below the crust was a layer of water in some strange kind of density inversion. Slow seepage of the water layer produced the humid jungle-like conditions of the Garden of Eden with its great vapor canopy. To create Noah's flood, God used an earthquake to rupture the crust and allow the trapped water layer to pour forth as the Biblical "fountains of the deep."

According to Stevens, that Dead Sea fault zone marks the boundary of Earth's greatest tectonic plates. (In reality the fault is only a medium-scale plate boundary separating the African plate from the Arabian plate.) After the escape of the waters, this deep fracture tapped the mother lode layer of petroleum which bled upwards to form the asphalt and tar

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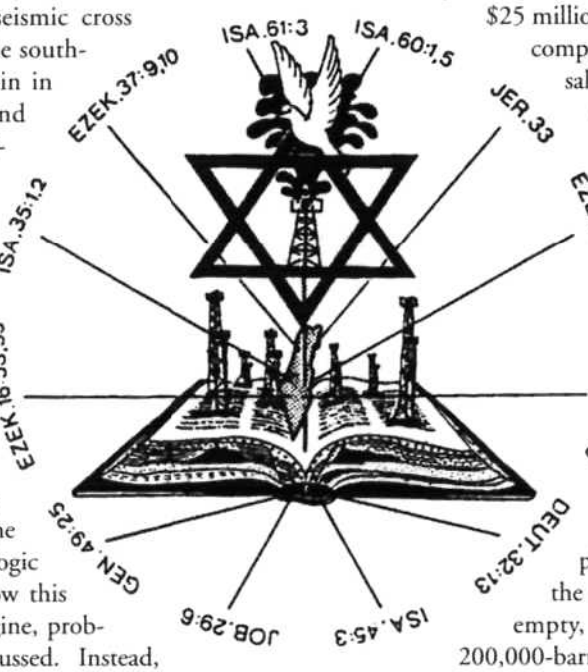
seeps in the region of Sodom and Gomorrah. According to Stevens's interpretation of prophecy, God originally intended all this oil to be the basis of Israel's future riches and greatness. But unfortunately, the people became evil and undeserving so God caused the fault to move. The resulting friction ignited the oil and it exploded under Sodom and Gomorrah. Somehow the heat was so intense that it created an "entirely new form of sulfur which melted at 10,000 degrees and rained down on those evil people as fire and brimstone." The intensity of the heat converted the rock to salt (a chemical process that would certainly have delighted the alchemists of the Middle Ages). As evidence of this, Hayseed showed satellite photos and crude versions of Geological Survey of Israel seismic cross sections with a big salt plug at the southwest corner of the Dead Sea basin in the vicinity of Sodom and Gomorrah. Encouraged, the audience enthusiastically joined him in his incantation, "The greatest oil field on Earth is under the southwest corner of the Dead Sea!"



Returning to his satellite photos, Stevens explained that the new salt plug blocked the upward flow of the huge petroleum layer destined for Israel. Thus diverted, the oil flowed eastward into the great reservoirs of the Middle East. Even though a geologic plumbing system that would allow this flow is almost impossible to imagine, problems such as that were never discussed. Instead, Stevens changed direction to focus on the fact that 85 percent of the world's known oil resources are presently under Islamic control. He assured his audience that with his drill hole through the salt plug to tap the mother lode of petroleum, he would change that imbalance by making Israel the greatest oil producing nation on Earth. Quoting Isaiah 60:5 he declared, "Then you shall see and be radiant, your hearts shall thrill at the glorious deliverance; because the abundant wealth of the Dead Sea shall be turned to you. Unto you shall the nations come with their treasures."

Stevens pointed out that this drill site along the Dead Sea is at the lowest point on Earth and as everyone knows, fluids flow downhill. Thus, the well will not only tap the mother lode but will eventually drain the Arabian oil fields (by some unstated but geologically unthinkable mechanism). In accord with prophecy, the enraged Arabs will attack Israel at the final battle of Armageddon. The plains near Mt. Carmel, according to Stevens, cover a vast reservoir of oil, and it is across these plains that the Arabs will attack. God will ignite the underlying oil to incinerate the Arabs and ensure the victory of the righteous, at least according to Stevens's reading of the book of Revelations.

My strongest impression of the evening was of the interplay of prophecy, prophets, and profits. The entire talk was sprinkled with overhead projections and handouts of about twenty verses of Biblical prophecy. Most prophecies were supplemented by Stevens's interpretation inserted in parentheses. Considerable strain seemed to be required of the English language to make Biblical statements conform to oil exploration and the present world of geopolitics. However, once these prophecies were accepted there could be no doubt that, "Repeat after me . . . !"

In 1985 Stevens organized a consortium to drill at the Dead Sea site, but the drill string sheared off at about one mile depth. He is now planning to drill a 19,000-foot, $25 million well through the salt plug, and his company is about to offer public stock sales for this venture. If the evening's talk was a promotion, it was done as a soft sell but the phone number listed on the handouts to reach his company was clear, as was the possibility of merging prophecy with profits. Stevens pointed out that God's plans even include the former Shah of Iran's financing of a 42-inch oil pipeline that was completed across Israel from the Red Sea to the Mediterranean, but never used because of the Shah's fall. This pipeline passes within a few miles of the drill site and is now standing there empty, waiting to take the supposed 200,000-barrel-a-day production that will result just as soon as the well is completed.

The more immediate financial aspects of the evening were well covered starting with the $7 admission charge ($7 × 150 = $1,050) to cover rental of the room, etc. The plethora of video tapes for sale, mostly at $20 to $40, certainly met their production cost as did several thin pamphlets selling at $5 to $10 each. Considering the admission cost it was surprising to see an additional offering with helpers passing collection plates through the audience. The number of $10 and $20 bills and personal checks in those plates was impressive. Following the mid-evening break Stevens proceeded to extol the great works done by the Prophecy Club and to propose that this warranted an unheard-of *second* special collection. He noted that no one should feel any pressure to contribute and that this offering should be from the heart. He made a show of announcing his personal check for $1,000. As the plate was passed this second time, he kept rephrasing the theme that this offering should be voluntary, that there was no peer pressure to do God's work, and so on. I watched in amazement as people around me wrote additional checks and put more $10 and $20 bills into the plate.

The evening concluded with a revival-style prayer session

complete with exhortations to anyone who had sinned and wanted redemption to raise their hands while everyone, with one exception, bowed their heads. Stevens acknowledged these secret hands and counted them as part of the increasing list of recipients needing prayer. With an "Amen," Stevens invited everyone who felt the evening had been a success to stand and let it be known. In response, 149 people stood, waved their hands in the air and shouted "Hallelujah" and "Amen."

Hayseed Stevens folded his oil operations into and took over the Kit Karson Corporation, a 19-year-old oil company listed as KTKC on the NASDAQ. In 1996 KTKC reported its total assets as $1,604 with a net loss of $1,179. After the takeover, the July 23, 1998, SEC annual report for KTKC lists Stevens as president, holding 56.5 percent of the common stock, which has "no par value."

The latest Church of the Mail Newsletter from Hayseed Stevens announced that on October 13, 1998, the Israel Oil Company had granted him drilling rights for 32,000 acres at the southwest end of the Dead Sea. The first was well slated for April 2000 at a cost of $30 million and an expected depth of 19,000 feet. To judge the effect of this news on the market, the December 8 share price of KTKC was $0.24, nearly its lowest point in a 52-week trading range of $0.21 to $13.75. In early summer 1999 KTKC changed its name on the NASDAQ to NESS, one of Hayseed's early names for his company. On July 2, 1999, NESS traded at $0.48 per share.

Whatever happens with his oil explorations, I'll always find that January evening one to be remembered and certainly one not easily confused with any other lecture on oil resources. "Right now we are only one well short of finding (repeat after me) the greatest oil field on Earth . . ." □

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Projective Measures of Personality and Psychopathology

How Well Do They Work?

Although projective techniques remain among the most popular of all psychological measures, many critics have branded them pseudoscientific.

SCOTT O. LILIENFELD

Whatever their theoretical differences, all psychologists agree on one maxim: individuals differ greatly from one another in their mental attributes. In the domains of personality and psychopathology, two types of tests have been used to assess these individual differences, *objective* and *projective*. Objective measures contain relatively clear-cut stimuli (e.g., such items as "I like to go to parties") and require subjects to respond in one of a few fixed ways (e.g., by answering true or false). Many objective tests, including the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway and McKinley 1940) and its revision, the MMPI-2, have been shown to be useful in assessing both personality and mental illness. For example,

the scales of the MMPI and MMPI-2 (e.g., schizophrenia, depression) are associated with other indicators of psychopathology, such as diagnoses obtained by clinical interviews (Zalewski and Gottesman 1991).

In contrast to objective tests, projective tests typically present subjects with an ambiguous stimulus, such as an inkblot, and ask them to make sense of this stimulus. Unlike objective measures, projective measures grant subjects considerable leeway in their responses, and the range of possible answers is often limited only by the respondent's ingenuity, loquacity, or both. Nevertheless, as Meehl (1945) observed, these two types of tests probably differ more in degree than kind. Objective test items (e.g., "I sometimes feel sad") often entail a certain degree of ambiguity, because they depend partly on subjects' interpretations of subjective terms (e.g., "sometimes").

Most projective tests are highly controversial largely because the evidence for their reliability and validity is weak.

The rationale underlying projective tests is the *projective hypothesis*: when interpreting an ambiguous stimulus, subjects ostensibly project aspects of their personality onto the stimulus. The concept of projection derives from Freud (1911), who conceptualized it as a defense mechanism by which individuals unconsciously ascribe their negative attributes to others. Freud's concept of projection ("classical projection"), however, is believed by psychoanalysts to differ from the "assimilative projection" that presumably occurs in projective tests, which is the more general tendency of individuals' personality characteristics to influence their interpretation of ambiguous stimuli (Sundberg 1977). Projective tests are often viewed as the "stealth weapons" of the psychologist's armamentarium. By circumventing respondents' conscious defenses, they purportedly provide information concerning underlying conflicts.

Many projective measures, particularly inkblot tests, capitalize on the phenomenon of *pareidolia* (Schick and Vaughn 1995), the perception of meaning in visually meaningless stimuli. Although pareidolia can lead to bizarre misperceptions, such as the "Face on Mars" (Gardner 1988), it is probably a byproduct of a generally adaptive propensity toward pattern recognition (Gilovich 1991).

Most projective tests are highly controversial (Gittelman Klein 1986; Lowenstein 1987), largely because the evidence for their *reliability* and *validity* is weak. Reliability refers to consistency in measurement; a reliable test yields comparable scores across different occasions (test-retest reliability) and different examiners or scorers (inter-rater reliability).[1] Validity refers to truth in advertising; a valid test measures what it purports to measure. The relation between reliability and validity is asymmetrical. A reliable test is not necessarily valid—imagine a test that purports to assess individuals' intelligence by measuring their heights—but a valid test is necessarily reliable.

Projective Tests: A Brief History

The term "projective test" was coined by Frank (1948), who likened projective tests to psychological "X-rays" that yield fleeting glimpses into otherwise unobservable mental processes. The first projective test was probably devised in 1879 by Sir Francis Galton. Galton's test was a measure of word association: subjects were presented with a set of words and asked to provide their first response to each word. Carl Jung, the Swiss psychiatrist and protégé of Freud, later used the word association test in conjunction with blood pressure indices to detect what he termed "complexes," i.e., constellations of feelings and thoughts organized around an emotionally charged issue (e.g., the "mother complex"). According to Jung, a delayed or physiologically pronounced response to a word often belies the existence of a complex.

Several other projective tests were developed around the turn of the century. Wilhelm Stern created the Cloud Picture Test to assess individual differences in responses to drawings of clouds (Aiken 1996). In 1896, Alfred Binet, the French psychologist who developed the first intelligence test, experimented with examining subjects' responses to inkblots. A third early projective technique, pioneered by another protégé of Freud, the Viennese psychoanalyst Alfred Adler, is the elicitation of the respondent's earliest memory. Adler (1931) claimed that the first memory provides information regarding the origins of inferiority feelings and one's means of compensating for them, although he never conducted systematic research to substantiate these assertions.

Not until the fourth and fifth decades of the twentieth century, however, did projective tests, particularly the Rorschach Inkblot Test, come into widespread use. The aftermath of World War II witnessed a heightened demand for the diagnosis of veterans returning from combat duty with emotional problems. Projective tests thus became a staple in many assessment batteries. Over the past several decades, however, projective tests have become targets of increasing criticism. As noted by Aiken (1996), even advocates of these tests acknowledge that they are often (1) insufficiently reliable or valid to justify their clinical use, (2) easily faked in either a good or bad direction, (3) susceptible to subtle situational factors, including the personality of the examiner and mood of the examinee, and (4) subjective in scoring and interpretation.

A sampling of quotations from research psychologists over the past four decades reveals a persistent dissatisfaction with the status of many projective tests, and the Rorschach in particular:

- ". . . the rate of scientific progress in clinical psychology might well be measured by the speed and thoroughness with which it gets over the Rorschach" (Jensen 1965, p. 238).

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• "Projective techniques do not provide an X-ray of the personality nor a 'royal road to the unconscious,' as Freud described dreams to be. The Rorschach and other procedures are not magical . . ." (Sundberg 1977, p. 223).

• "Projective techniques present a curious discrepancy between research and practice. When evaluated as psychometric instruments, the large majority make a poor showing. Yet their popularity in clinical use continues unabated" (Anastasi 1982, p. 564).

• "The Rorschach is indeed projective—for the interpreter. Compelling as the interpretations are, and as fun as the test is to give, it doesn't provide the insight about the subject that its users allege it provides" (Dawes 1994, p. 149).

Nevertheless, projective tests continue to enjoy widespread popularity. Durand, Blanchard, and Mindell (1988) found that 49 percent of directors of clinical psychology graduate programs and 65 percent of directors of clinical psychology internships believed that training in projective techniques was important. Watkins, Campbell, Neiberding, and Hallmark (1995) found that five projective tests, including the Rorschach and Thematic Apperception Test, were among the ten measures most often used by clinical psychologists. For example, 82 percent of clinical psychologists reported that they administered the Rorschach at least "occasionally" in their test batteries and 43 percent reported that they "frequently" or "always" administered it.

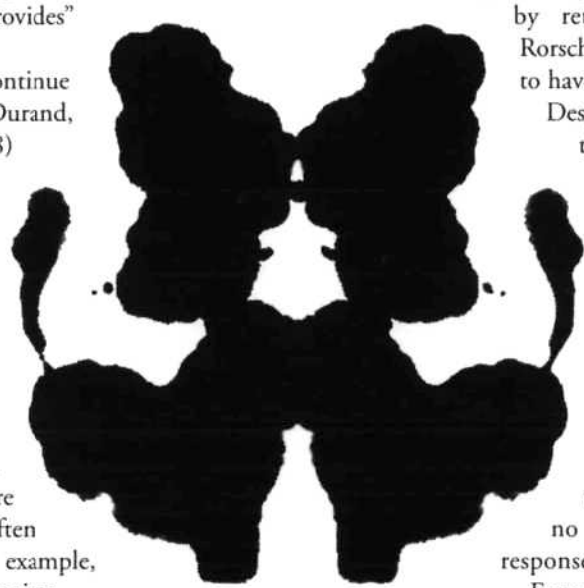

Figure 1. *The Rorschach-like Inkblot*: From Anastasi/Urbina, *Psychological Testing*, 7/E, P. 413. Reprinted by permission of Prentice Hall, Upper Saddle River, New Jersey.

A Consumer's Guide to Projective Tests

The following is a guide to six major projective tests, consisting of a description of each test and a brief evaluation of its psychometric properties (e.g., reliability and validity). Because of space constraints, some of the more unusual or obscure projective techniques (see sidebar) cannot be reviewed in detail here. In addition, the projective interpretation of handwriting (i.e., graphology) has been reviewed elsewhere (Beyerstein and Beyerstein 1992) and will not be discussed here. Suffice it to say that graphology has been found to be of little or no value in assessing personality (Furnham 1988).

(1) Rorschach Inkblot Test. Perhaps the best known of all projective tests was developed by Hermann Rorschach in 1921. The Rorschach consists of ten cards, almost all of which are bilaterally symmetrical. Five of these cards are in black-and-white, and five contain color (see figure 1). The subject is asked to examine each inkblot and to say what it looks like; respondents are typically permitted to provide as many responses to each card as they wish.

Rorschach interpretation involves three sets of variables: *location*—where on the blot subjects saw what they saw; *content*—what subjects report seeing; and *determinants*—what made subjects report what they saw. Determinants, which are emphasized in modern Rorschach interpretation systems, include form, shading, and color. Although numerous Rorschach scoring schemes have been developed (e.g., Beck, 1944), the Comprehensive System of Exner (1991) has gained ascendance during the past decade. Exner's system, which yields a large number of indices designed to assess numerous psychological characteristics, was developed by retaining the features of extant Rorschach scoring systems that appeared to have adequate research support.

Despite its popularity, the scientific status of the Rorschach has repeatedly been called into question. Wood, Nezworski, and Stejskal (1996) concluded that neither the reliability nor validity of most Exner indices have been satisfactorily established. For instance, although the number of reflection responses (e.g., "A cat looking into a mirror") is hypothesized to be related to narcissism, the results of several studies reveal no association between reflection responses and narcissism. In addition, Exner's Depression Index has not been found to be associated with diagnoses of depression. Nor does Exner's Suicide Constellation appear useful in predicting suicide (Eyman and Eyman 1992).

Certain Rorschach indices, however, may possess at least *some validity. A quantitative review by Parker, Hanson, and* Hunsley (1988) revealed that a number of Rorschach indices possessed validities approximately equal to those of the scales of the MMPI-2.[2] For example, the F+%, which denotes the number of "good form" responses (i.e., responses that correspond to the shape of the inkblot), is inversely associated with schizophrenia and other conditions characterized by disordered thinking. Nevertheless, as Dawes (1994) notes, the F+% and similar indices are actually nonprojective in nature, because they assume that the inkblots do in fact resemble certain stimuli. Consequently, these findings do not provide support for the use of the Rorschach as a projective test, although they suggest that it may be useful for assessing thought disorder. Even here, however, Rorschach appears to be inferior to the MMPI Schizophrenia scale in the prediction of schizophrenia diagnoses (Archer and Gordon 1988).

(2) Thematic Apperception Test (TAT). The TAT, developed in 1935 by Henry Murray and his student Christiana Morgan, consists of thirty-one cards, most of which portray individuals

in ambiguous situations (see figure 2). One TAT card, Card 16, represents the epitome of ambiguity: it is entirely blank. The TAT examiner typically selects approximately 10 cards that seem especially relevant to the subject's presenting problems. The subject is then asked to compose a story describing the actions, thoughts, and feelings of the characters on each card. Although the TAT is usually scored impressionistically (i.e., on the basis of unquantified clinical impressions), standardized coding schemes have been developed for scoring certain personality variables. For example, McClelland (1961) created a TAT scoring system to assess achievement needs.

The evidence for the TAT's validity is arguably even more problematic than that of the Rorschach, largely because many TAT studies *do not use standardized scoring* methods. A review of 105 studies of McClelland's (1961) scoring scheme (Spangler 1992) provided both good and bad news for the TAT. The good news? McClelland's scheme performed about as well as self-report measures of achievement when measured against objective criteria for achievement (e.g., grades). The bad news? Neither type of measure performed especially well; the correlations between objectively assessed achievement and both the TAT and self-report measures were statistically significant (i.e., too large to have arisen by chance), but very low in magnitude.

Figure 2. *The TAT stimulus (two faces)*: Reprinted by permission of the publisher from Henry A. Murray, Thematic Apperception Test, Cambridge, Mass.: Harvard University Press, Copyright ©1943 by the President and Fellows of Harvard College, ©1971 by Henry A. Murray.

Many other studies of the TAT's validity have yielded unimpressive results (Gittelman Klein 1986). For example, Sharkey and Ritzler (1985) found that the TAT could not distinguish depressed or psychotic patients from normals on the basis of the emotional tone of stories. In addition, TAT responses have often been found to exhibit poor test-retest reliability (Vane 1981; Winter and Stewart 1977). Because reliability is a prerequisite for validity, this finding does not bode well for the TAT's validity.

(3) Draw-a-Person Test (DAP). The DAP simply asks subjects to draw a person in any way they wish, and is traditionally interpreted in terms of specific bodily signs. For example, large eyes are believed to indicate suspiciousness, and a large head is believed to indicate concerns regarding one's intelligence (Machover 1951).

Nevertheless, research has consistently indicated that these signs are invalid (Kahill 1984; Swenson 1968). Indeed, the only replicable finding in the DAP literature is that the overall quality of drawing bears a modest relation to the severity of psychopathology (Roback 1968). Gregory (1992) summed up the opinions of many researchers when he concluded that "Approximately a century behind in time, the DAP might well be described as phrenology for the twentieth century" (p. 468). Despite this negative verdict, Smith and Dumont (1995) found that many clinicians continue to make unwarranted interpretations on the basis of DAP protocols.

(4) Bender-Gestalt Figure Drawing Test. The Bender-Gestalt asks the subject to copy a series of drawings containing shapes, lines, and dots. Although this test is typically used to assess brain damage, many psychologists have adapted it to assess psychopathology. Certain test behaviors are believed to be indicative of schizophrenia, depression, or anxiety. In a review of the literature on the Bender-Gestalt, however, Naglieri (1992) concluded that *there is little support for the use of* this measure as a projective device. For example, Trahan and Stricklin (1979) found that Bender-Gestalt signs purportedly related to aggression (e.g., an increase in the size of the first several drawings, drawings that collide with each other) were not associated with overt hostility. Moreover, there is little evidence that clinical experience enhances the validity of Bender-Gestalt interpretations. Goldberg (1959) found that psychologists were no better than their secretaries (!) at differentiating psychiatric patients from brain damaged patients on the basis of Bender-Gestalt drawings, and that the diagnostic accuracy of both groups was relatively low.

(5) Rosenzweig Picture-Frustration Study (PFS). (Rosenzweig, Fleming, and Clark 1947). This measure, which has the distinction of being featured in the film *A Clockwork Orange*, was designed to assess propensities for several types of aggression. It consists of cartoons, each of which contains two people. In each cartoon, the person on the left says something that is potentially anger-provoking, and the subject is asked to state how the person on the right would respond verbally (see figure 3). The evidence for the validity of the Rosenzweig PFS, unlike that for most projective tests, appears promising. For example, scores on this test increase following frustrating situations (Muehleman, Hollinden, and Batsel 1981) and correlate with self-reported (but not teacher-reported) verbal and physical aggression among children (Graybill, Williams, Bodmer, and Peterson 1991). Some of these findings, however, have been inconsistent and difficult to replicate (LaVoie 1986).

(6) Sentence Completion Test (SCT). In this test, of which there are many versions (e.g., Rotter 1946), the subject is pre-

sented with a series of stems (e.g., "If my mother . . .") and is asked to complete each stem by forming a sentence. The evidence for the reliability and validity of most SCT versions is unimpressive (Aiken 1996). One exception is a version of the SCT that has been developed by Loevinger (1976) over several decades.

Loevinger uses her SCT version to assess a construct she calls "ego development," which refers to the maturation of the self. As one progresses from the lowest to the highest levels of ego development, one experiences an increasing capacity to perceive the world in shades of gray. For example, a conformist (low level) response to the stem "When they avoided me . . ." is "I felt as if I wasn't wanted," whereas an autonomous (high level) response is "I wondered why they did—was it me? Or was it them? Or something else?" (Loevinger 1987).

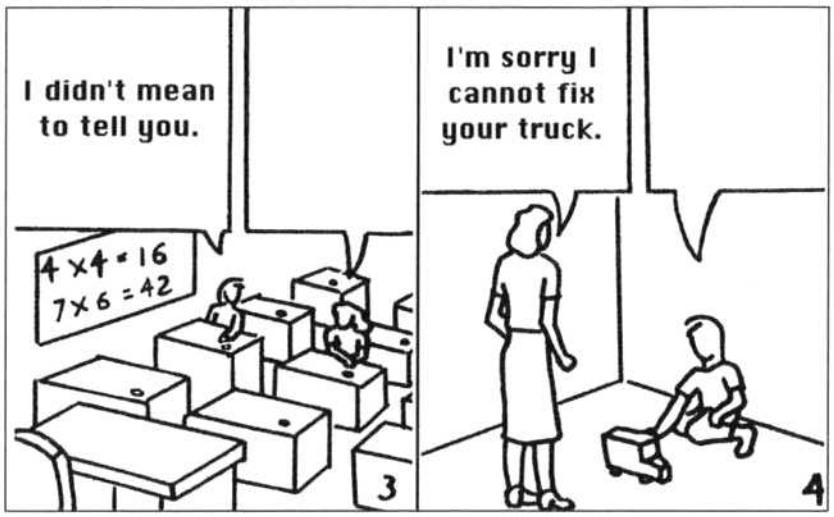

Figure 3. *Rosenzweig Picture Frustration Study* (cartoons with balloons to be filled in by subjects): Copyright ©1976 by Saul Rosenzweig. Reproduced by permission.

Loevinger's SCT was developed by a sophisticated method of test construction in which the results of SCT protocols were used to progressively refine the scoring key. Although Loevinger's SCT is not without its critics (Snarey, Kohlberg, and Noam 1983), it is one of the few projective tests to demonstrate consistent validity. For example, scores on this test are positively associated with empathy and moral development, and negatively associated with delinquency and psychopathology (Loevinger 1984; Williams and Vincent 1985).

The Bottom Line: How Well Do Projective Tests Work?

The question contained in this article's title is not easily answered in a blanket statement. On the positive side, certain projective tests appear to yield indices with at least some validity. With the possible exception of the Rosenzweig Picture-Frustration Study (PFS) and Loevinger's Sentence Completion Test (SCT), however, the levels of validity are modest at best and nonexistent at worst. It seems safe to conclude that the popularity enjoyed by most projective tests is outstripped by the mediocre, and in most cases feeble, evidence for their validity.

Perhaps the most damaging criticism of most projective tests is their negligible or absent *incremental validity*. The concept of incremental validity, which was introduced by Meehl (1959) and Sechrest (1963), refers to the extent to which a test contributes information to the prediction of a criterion, such as a diagnosis, above and beyond information that is already available (e.g., demographic information, scores on more easily administered psychological tests). There is no convincing evidence that the Rorschach, for example, possesses incremental validity over and above the MMPI or other tests (Wood et al. 1996). An anecdote relayed to me by a former supervisor, which I paraphrase here, nicely illustrates the concept of incremental validity. A graduate student had given the Rorschach to a patient whom he suspected of being homosexual (this incident occurred prior to the mid 1970s, when homosexuality was still considered a mental disorder by the American Psychiatric Association). The student triumphantly reported his findings to his supervisor: "This patient has nearly every homosexual sign on the Rorschach. I was right! As I suspected, he's homosexual." The supervisor looked sternly at the student and replied, "I know." When the perplexed student asked "How did you know?," the supervisor's responded, "I asked him."

Another difficulty with the hypotheses derived from many projective tests is their falsifiability. For example, if a Thematic Apperception Test (TAT) protocol reveals a high level of aggression, should the subject be expected to exhibit high levels of aggression in the real world? Or might it instead mean that the subject is projecting aggression that he or she is afraid to express, and should therefore be expected to exhibit *low* levels of aggression in the real world? The latter possibility has sometimes been used to explain away negative findings for the TAT and other projective tests (Vane 1981). This ambiguity makes the findings from many studies of projective tests difficult to interpret.

There is some suggestion that the few promising projective tests, such as the Rosenzweig PFS and Loevinger SCT, may share one feature. Specifically, these tests attempt to assess a single psychological attribute, rather than to provide a comprehensive assessment of many attributes. Why might this difference be important?

With apologies to fans of The Rolling Stones, I propose that the answer may be found in what I like to call "The Rolling Stones Effect." Although some of my friends vigorously disagree with me, I have long maintained that none of the members of the Rolling Stones can sing especially well. Yet when they sing together as a group, they aren't all that bad. The Rolling Stones Effect illustrates what psychologists term the principle of aggregation. By pooling across a number of observations (in this case, singers) the random errors con-

tained in any one observation (in this case, the imperfections in each singer's voice) are canceled out. Psychologists have long recognized that single test responses are unreliable, because each contains a great deal of unsystematic error or "noise" (Epstein 1979), most of which is produced by random situational factors (e.g., the mood of the respondent, the personality of the examiner). By averaging across many test responses, this noise is minimized and the weak "signal" contained in these responses is amplified.

By using a large number of responses to assess a single psychological dimension, the Rosenzweig PFS and Loevinger SCT capitalize on The Rolling Stones Effect. In contrast, the Rorschach, which attempts to assess many different traits with only a few responses per trait, ignores this principle. Consequently, the Rorschach, like most projective tests, is a "jack of all trades, master of none." This hypothesis is consistent with the findings of Meyer (1993), who reported that the correlations between several Rorschach indices and MMPI-2 measures of psychopathology were high only when the subject had given a large number of Rorschach responses. In other words, some Rorschach indices appeared to possess validity, but only when there were enough responses on which to base them.

The open-ended format of projective tests appears to be a double-edged sword. This format permits respondents to structure the test stimuli in any way they wish, thereby allowing personality variables to influence their responses. At the same time, however, the open-ended nature of projective tests permits many extraneous variables—such as the examiner's personality, the specific wording of prompt questions (Aiken 1996), and even the transient motivational state of the examinee—to come into play. Hungry subjects, for example, are especially likely to tell TAT stories involving food (McClelland 1951).

Why Are Projective Tests So Popular?

Given the weak evidence for the reliability and validity of most projective tests, one is left to ponder why they remain so popular. A number of reasons come to mind. First, tradition dies hard. Many clinicians were trained in the use of projective

A Sampling of Other Projective Tests

In addition to some of the better known projective measures reviewed here, a number of more arcane or bizarre projective tests have been developed. These include the following measures:

- **The Szondi Test** (Szondi, Moser, and Webb 1959) consists of several sets of photographs of actual psychiatric patients suffering from paranoia, mania, and other disorders. Subjects are asked to select the two patients they like best and least from each set, the assumption being that these choices reveal subjects' unconscious needs.
- **The Hand Test** (Wagner 1962) presents subjects with various drawings of moving hands and asks them to guess what each hand "might be doing." The Hand Test uses these guesses to assess aggression, anxiety, and other traits.
- **The Lüscher Color Test**, which became well known following the book by Lüscher and Scott (1969), purports to assess subjects' personality traits by examining their preferences for various colored cards. For example, subjects who prefer blue are hypothesized to possess needs for tranquility; subjects who prefer green are hypothesized to possess needs to impress others.
- **The Blacky Test** (Blum 1950) consists of twelve cartoon drawings of a black puppy engaged in ambiguous activities, and requires subjects to tell a story about each drawing. This test is intended to assess the presence of psychological conflicts derived from Freudian theory. For example, a cartoon of Blacky watching a knife descend upon his sibling's tail is purported to assess castration anxiety.
- **The Mira Myokinetic Psychodiagnostic Test** (Mira 1940) claims to assess psychopathological tendencies by examining the characteristics (e.g., length, variability) of lines drawn by blindfolded subjects.
- **The Lowenfeld Mosaic Test** (Lowenfeld 1949) asks subjects to create mosaic designs out of 465 multicolored wooden shapes, and is purportedly helpful in the diagnosis of schizophrenia, depression, and other conditions.
- **The Draw-A-Car Test** (Loney 1971) asks children to draw a car and asks them twenty-four questions about this drawing (e.g., "How fast will it go?"). It supposedly helps to identify children with encopresis and enuresis (i.e., difficulty in inhibiting defecation and urination, respectively).
- **The Pigem Test** (see Haworth and Rabin 1960) assesses subjects' personality traits by asking them what kind of animal they would like to be if they "had to return to this world and could not be a person."
- **The Rock-A-Bye Baby Test** (Haworth 1961) is a film consisting of puppets enacting the parts of various characters, including a child, a newborn baby, his mother, and an evil witch. It is designed to assess children's jealousy toward younger siblings, guilt regarding their aggressive feelings, and other emotions.

Most of these tests have either been inadequately researched (e.g., the Pigem Test) or found to possess inadequate validity. The Szondi Test, for example, appears essentially useless in the assessment of personality (Cronbach 1960), while the Blacky Test's reliability and validity are both questionable (LaVoie 1984). Moreover, despite its popularity in parts of Europe, the Lüscher Color Test has not withstood careful scrutiny. For example, it has been found to possess low test-retest reliability (Brauen and Bonta 1979) and to be unrelated to scores on anxiety measures (McAloon and Lester 1979) and personality inferences derived from the MMPI (Holmes et al. 1984).

devices and have grown accustomed to administering them for decades. Moreover, many clinicians almost certainly receive communal reinforcement (Carroll 1998) from like-minded colleagues for administering these tests. Second, research on what Meehl (1956) called the P.T. Barnum effect—the tendency of subjects to regard vague and uninformative statements (e.g., "You have a great deal of unused potential") as accurate self-descriptions—indicates that subjects are especially likely to accept Barnum statements that they believe originated from projective, as opposed to objective, tests (Snyder, Shenkel, and Lowery 1977). Presumably, this is because most subjects view projective tests as mysterious and inscrutable, and leave these tests perplexed about what their responses mean. In the psychotherapeutic context, this greater client acceptance of projective test interpretations may become translated into greater clinician confidence.

Perhaps the principal reason for the popularity of projective tests can be found in the remarkable phenomenon of illusory correlation.

Perhaps the principal reason for the popularity of projective tests, however, can be found in the remarkable phenomenon of *illusory correlation.* This concept was introduced by Loren and Jean Chapman, who demonstrated that individuals often perceive statistical associations between projective test signs and certain personality traits even when these associations are nonexistent. For example, Chapman and Chapman (1967) showed undergraduate subjects a series of fabricated Draw-A-Person (DAP) protocols containing certain physical features (e.g., large eyes, a big head), along with a description of the personality characteristics of the individual who supposedly produced each drawing (e.g., paranoid, concerned about masculinity). Subjects were asked to estimate the extent to which these physical features and personality characteristics co-occurred. Unbeknownst to subjects, there was *no* correlation between the (DAP) features and personality characteristics, because these two sets of variables had been paired randomly.

Nevertheless, subjects consistently perceived certain DAP features to be associated with certain personality traits. Interestingly, these were the same features that clinicians tend to believe are associated with these personality traits—and that have been found to be invalid in research studies (Kahill 1984). For example, subjects reported that individuals who produced drawings with large eyes tended to be paranoid, and that individuals who produced drawings with large genitals tended to be concerned about their sexuality. In these cases, subjects appeared to rely on their implicit notions regarding the associations between specific physical features and specific personality traits. Chapman and Chapman (1969) later extended these findings to the Rorschach.

The Chapmans' findings do not demonstrate that projective tests are of no value. But they do suggest that clinicians will often be convinced of the validity of projective tests even in the absence of evidence. Like many "cognitive illusions" (Piattelli-Palmarini 1994), our propensity toward illusory correlation may represent a deeply ingrained by product of the human mind's propensity to perceive patterns and relationships in random data (Gilovich 1991). If so, clinicians will need to master a skill that does not come naturally to any of us: disregarding the vivid and compelling data of subjective experience in favor of the often dry and impersonal results of objective research.

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Notes

1. A third type of reliability, internal consistency, essentially refers to the extent to which the items on a test relate to each other. This type of reliability will not be discussed further here.

2. A recent meta-analysis of Parker et al.'s (1988) data set by Garb, Florio, and Grove (1998), however, suggests that the MMPI is significantly more valid overall than the Rorschach.

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What Every Skeptic Should Know About Subliminal Persuasion

Classic research by cognitive and social psychologists suggests that subliminally presented stimuli can be perceived and can influence individuals' low-level cognitions. More recent investigations suggest that such stimuli can also affect individuals' high-level cognitive processes, including attitudes, preferences, judgments, and even their behavior.

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The report of my death was an exaggeration.

—Mark Twain, in a note to the *New York Journal*, June 1, 1897

Readers of the SKEPTICAL INQUIRER are well acquainted with instances of mismatch between popular belief and scientific evidence. Despite an utter lack of scientific support, for example, many individuals place a great deal of belief in such topics as astrology (Carlson 1985; Dean 1987), facilitated communication (Dillon 1993; Mulick, Jacobson, and Kobe 1993), homeopathy (Barrett 1987), alien abductions (Carlsburg 1995; Randles 1993; Turner 1994) and even Elvis sightings (Moody 1987).

Issues such as these are "slam dunks" for skeptics: There can be little reconciling such beliefs with evidence that simply does not exist.

In other cases, though, where there is *some* scientific support on which to pin one's belief, there may still be more belief than is warranted. Graphologists, for example, who use samples of individuals' handwriting to determine enduring aspects of their personalities, consistently claim greater predictive validity than can be supported empirically (Nevo 1986; Scanlon and Mauro 1992). Some might argue the same for ESP, for which some evidence might actually exist (Bem and Honorton 1994; but see Hyman 1994). It is in domains such as these that the skeptic's role is more subtle, but just as important. One key aspect of this role is to determine what the available scientific evidence does and does not support. With this in mind, our purpose here is to explore the psychological research on subliminal persuasion, an area in which popular belief may again outstrip available evidence.

Subliminal persuasion refers to the use of subliminally presented stimuli, or messages presented to individuals beneath their level of conscious awareness, that are intended to influence their attitudes, choices, or actions. Not surprisingly, reports that unscrupulous marketers were using this technique to influence consumer behavior have historically prompted alarm (Cousins 1957; Key 1980). Yet, as many writers have suggested, such panic is probably unwarranted: There is simply no good evidence to support the conclusion that subliminal messages implanted in advertisements can exert an influence over whether one drinks Coke or Pepsi, endorses a particular viewpoint, or votes for candidate X over candidate Y (Moore 1988; Pratkanis and Greenwald 1988; Trappey 1996; Vokey and Read 1985).

Or is there? We will explore why the notion of subliminal persuasion might not be as far-fetched as some have supposed. Our point of departure, in particular, is an article appearing in the SKEPTICAL INQUIRER in 1992 by Anthony Pratkanis (see also Moore 1992). In his article, Pratkanis traced the historical roots of the belief in the powers of the unconscious, nicely debunked James Vicary's famous "Eat Popcorn/Drink Coke" hoax, and described the compelling results of some of his own research on the ineffectiveness of subliminal self-help audio tapes.

Still, for all its strengths, we believe the Pratkanis article, and others like it, may have left readers with an incomplete picture of the state of the art regarding subliminal presentation of stimuli. Accordingly, we endeavor to acquaint readers of the SKEPTICAL INQUIRER with the varied (and thriving) use of subliminally presented stimuli in cognitive and social psychological research. Specifically, we review evidence suggesting that cognition can occur without conscious awareness, and that this unconscious cognition can be affected by subliminal stimuli, thereby influencing individuals' judgments, attitudes, and even their behavior. Indeed, this recent evidence suggesting that subliminal stimuli can influence behavior gives us pause in contemplating the possible effectiveness of subliminal persuasion in advertising.

Clarifying Ambiguities

The exact meaning of "subliminal" has been a source of controversy and confusion for decades. A common definition, however, is that a stimulus is subliminal (that is, below threshold) if it cannot be verbally identified (e.g., Cheesman and Merikle 1986; Fowler 1986, Greenwald and Draine 1997). The threshold used in this definition is that of conscious awareness, sometimes called a *subjective* threshold (Cheesman and Merikle 1986). This definition, of course, allows for the possibility that an individual perceives that *some* material was presented, but requires that its exact nature be unidentifiable. Nearly all of the studies we review use this definition, while the remaining adhere to a more conservative one: that individuals be unable to report even the presence of the stimulus.

Furthermore, there is a critical distinction to be made between subliminal *perception* and subliminal *persuasion.* Subliminal perception refers simply to the perception of stimuli that are below the threshold of conscious awareness.[1] Subliminal persuasion, on the other hand, requires that the subliminally presented stimulus have some *effect,* not simply on an individual's judgments, but on his or her attitudes or behavior. As others have noted, subliminal perception need not imply subliminal persuasion (e.g., Moore 1988).

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In this article, we restrict our discussion of subliminally presented stimuli to only those methods that are well supported by research evidence. Thus, audio self-help tapes with subliminal suggestions to "lose weight" or "be assertive" are not considered, nor are "backmasked" messages hidden in recorded music, or instances of messages embedded within pictures (such as the word "sex" airbrushed onto ice cubes or Ritz crackers). Research has shown convincingly that none of these methods is effective (Greenwald, Spangenberg, Pratkanis, and Eskenazi 1991; Moore 1982, 1988; Pratkanis 1992; Pratkanis and Greenwald 1988; Thorne and Himelstein 1984; Vokey and Read 1985). We focus instead on subliminal visual priming techniques, whereby stimuli are presented very quickly, and are typically followed immediately by a "pattern mask," such as a geometric shape or a series of random letters. This mask is intended to disrupt the individual's conscious processing of the stimuli—a bit like immersing pasta in cold water to halt the cooking process.[2]

Unconscious Processing: Out of Sight, But Not Out of Mind

Ask people to name a psychologist and there is disappointingly little variation in their answers. Virtually all of them name Sigmund Freud (with Dr. Joyce Brothers and TV's Frasier Crane running a distant second and third). Many people might be surprised to learn, then, that contemporary psychology bears little resemblance, either in substance or in methodology, to the work of Freud (Stanovich 1992). That said, at least one idea often attributed to Freud—the unconscious—has made a comeback in contemporary cognitive and social psychology (Bornstein and Pittman 1992; Cohen and Schooler 1997; Erdelyi 1996; Greenwald 1992; Kihlstrom 1987; Uleman and Bargh 1989). Modern psychologists do not subscribe to all of Freud's notions regarding the unconscious; instead, the term refers simply to those mental processes that occur without conscious monitoring or guidance. Viewed in this way, the unconscious figures prominently in many contemporary psychological theories (Greenwald and Banaji 1995; Wegner 1994). For example, numerous studies have shown that some memories that cannot be recalled consciously may nevertheless exert influence on a variety of mental processes (Schacter 1987). Others have noted that stereotypes can be readily applied without any conscious effort or awareness (Gilbert and Hixon 1991; Spencer, Fein, Wolfe, Fong, and Dunn 1998). Indeed, stereotypes seem to be most readily applied at those times when one's conscious capacities are the most limited (Bodenhausen 1990; Bodenhausen and Lichtenstein 1987; Macrae, Milne, and Bodenhausen 1994).

Furthermore, the causal determinants of behavior—why we do what we do—can also be unavailable to conscious awareness. People are notoriously poor at articulating the true causes of their actions and recognizing the importance of critical causal stimuli (Nisbett and Wilson 1977). In one experiment, participants were given a sentence-completion task containing a number of words related to the elderly (e.g., *old, wise, retired*). Later, after the experiment had ostensibly ended, these individuals walked more slowly to the elevator than participants in a control group, as if they had internalized the concept of "elderly." None of them showed any recognition of their decreased walking speed or of the high frequency of words related to the elderly in the sentence-completion task (nor could the effect be attributed to other plausible alternative factors, such as depressed mood). The result, concluded the researchers, was a direct effect of unconscious processing on behavior (Bargh, Chen, and Burrows 1996).[3]

Thus, ample evidence attests to the fact that much of what goes on in the mind is unavailable to conscious awareness. Note, however, that the "elderly words" experiment, as well as the research on stereotype activation, used stimuli that were, or could have been, consciously perceived. Since this article's primary concern is the influence of *subliminal* stimuli, we turn to whether subliminally presented stimuli can actually be perceived, while still remaining unavailable to conscious awareness.

We believe that the research literature leaves little doubt that the answer is yes. Many researchers have reported, for example, that words presented subliminally can influence subsequent judgments. Dixon (1981, see also Epley 1998a) found that participants given a subliminal prime (e.g., the word *pencil*) were faster than those who had not seen the prime to later identify a related word (e.g., *write*). Likewise, Marcel (1983) found that participants' identification of a color on a computer screen was facilitated when it was preceded subliminally by the name of the color, but was delayed when preceded by the name of a different color. Although these early studies have been criticized on methodological grounds (Holender 1986; Merikle 1982), similar effects have been found using methodologies developed to address these criticisms (Greenwald Draine, and Abrams 1996; Greenwald and Draine 1997; Merikle and Joordens 1997).

In all, dozens of studies using implicit tests of perception now attest to the fact that subliminally presented stimuli can be perceived (for reviews, see Bornstein and Pittman 1992; Greenwald 1992). But can they persuade?

Ghosts In the Machine: Subliminal Influences on Cognition

For many, the Eiffel Tower is a beloved symbol of Paris. But this was not always true. When the structure was built in 1889, it was despised by many—some Parisians even advocated its destruction (Harrison 1977). Likewise, popular reactions to new artistic movements that are now cherished, from Impressionist painting to rock and roll music, were initially negative (Sabini 1995).

How can these changes of heart be understood? One answer has been proposed by Robert Zajonc (1968), who suggests that "mere exposure" leads to liking: The more one sees something, the more one comes to like it. Thus, the more times people were exposed to the Eiffel Tower, paintings by Monet and Renoir, and the music of Elvis and the Beatles, the more

positive their evaluations became.

Experiments have demonstrated that this mere exposure effect is reliable, and, furthermore, that the phenomenon does not depend on one's conscious awareness of the exposure. In one study using subliminal stimuli, for example, participants were shown several irregular polygons for one millisecond, five times each. In a subsequent phase of the study, they were given pairs of figures, one that had been flashed to them previously and one they had never seen. Participants were then asked to make two judgments: which one had they seen before, and which one did they liked better. Although they were unable to determine which figure they had seen (these guesses did not depart reliably from a chance base-rate of 50 percent), participants did show an increased liking for the familiar shapes, preferring them 60 percent of the time (Kunst-Wilson and Zajonc 1980; see also Epley 1998b; Seamon, Marsh, and Brody 1984).

Other experiments have broadened the generalizability of this result. In one study, participants were subliminally exposed to a photograph of one of two males who posed as research subjects. Later, when participants engaged in a task with both confederates that involved several scripted disagreements between the two, they sided more often with the one whose picture they had previously seen, and also reported liking that individual more than his counterpart (Bornstein et al. 1987). Mere exposure evidently leads to liking, even when that exposure is beneath the level of conscious awareness.[4]

In other research, experimenters have shown that subliminal exposure to words related to various personality traits can influence how people judge others around them. In particular, exposure to words related to hostility (Bargh and Pietromonaco 1982), kindness, and shyness (Bargh, Bond, Lombardi, and Tota 1986) have been found to produce corresponding personality judgments (i.e., rating others as hostile, kind, or shy). Other investigators have demonstrated that subliminal exposure to pleasant and unpleasant photographs can also affect how target individuals are judged (Krosnick, Betz, Jussim, and Lynn 1992).

Subliminally presented stimuli can also affect judgments about the self, a point made in one of our favorite experiments in this literature. Psychology graduate students were asked to write down three of their ideas for possible research projects. They were then either exposed to a photograph of a familiar postdoctoral student from their laboratory or of the scowling face of their faculty advisor. Unaware that they had seen anything but flashes of light, the students were then asked to rate the quality of the research ideas they had listed. As predicted, those who had been exposed to the scowling face of their advisor rated their own ideas less favorably than did those who had been exposed to the smiling postdoc (Baldwin, Carrel, and Lopez 1991).

A follow-up experiment by the same authors makes a similar point. Catholic undergraduate women rated themselves more negatively on a series of trait adjective scales (e.g., honest/dishonest, moral/immoral) after subliminal exposure to a picture of the pope, but not after exposure to the advisor photograph used in the first study. Moreover, this was true only for participants who indicated that they practiced their religion regularly (Baldwin et al. 1991). This suggests that the effect of subliminal stimuli can be quite complex, mediated here by the personal relevance of the stimuli.

In all, these studies serve to demonstrate that subliminal stimuli can influence high-level cognitive processes, including preferences for geometric shapes, liking of individuals, personality judgments, and ratings of one's self-concept. Of course, to be of any use in a consumer context, these effects must go further. In addition to altering a consumer's *attitudes*, a marketer desires to affect his or her *behavior*. (It is not enough that one likes Pepsi, one has to buy some!) And as students of social psychology know, one need not follow from the other: There is often less correspondence between individuals' attitudes and behaviors than one might expect (LaPiere 1934; Regan and Fazio 1977; Wicker 1969). Therefore, it is incumbent upon us to document instances in which subliminally presented stimuli influence individuals' behavior. Such influence has only recently been documented, and only a handful of supportive experiments exist. Nevertheless, we find these experiments interesting and compelling. A full accounting of the possibility (or impossibility) of subliminal advertising warrants their consideration.

Subliminal persuasion requires that the subliminally presented stimulus have some *effect*, not simply on an individual's judgments, but on his or her attitudes or behavior. As others have noted, subliminal *perception* need not imply subliminal *persuasion*.

Subliminal Influences on Behavior

Can subliminally presented stimuli influence behavior? Recent investigations suggest that the answer may be yes. For example, Neuberg (1988) has argued that subliminally presented stimuli can influence behavior indirectly, by way of activating concepts that can influence the way individuals interpret the behavior of others. These interpretations, then, can lead individuals to opt for certain behavioral responses. For example, if the concept of hostility were activated subliminally, and caused individuals to "read" hostility into the behavior of others, these individuals might then choose to adopt a hostile course of action themselves. Though such an indirect effect is a far cry from the mindlessly acquiescent behavior conjured by the words "subliminal advertising," it nonetheless would represent an instance of subliminally presented stimuli affecting behavior.

To test this hypothesis, Neuberg confronted participants with a "Prisoner's Dilemma," an exercise in which individuals must choose to either cooperate or compete with another participant (Luce and Raiffa 1957). Before choosing, participants completed

questionnaires designed to assess their proclivity toward cooperation versus competition, and were exposed subliminally to either neutral words (e.g., *house, water, sound*) or competition-related words (e.g., *hostile, adversary, cutthroat*). Although the primes did not influence the behavior of those with a cooperative orientation, participants predisposed to compete did so to a greater extent when they were exposed to competitive words than when exposed to neutral words (Neuberg 1988).

More recently, Bargh and colleagues have provided even more compelling evidence that subliminal stimuli can influence behavior (Bargh et al. 1996; Bargh 1997). In contrast to Neuberg's notion of an indirect influence on behavior, Bargh suggests that subliminally presented stimuli can influence behavior *directly*—that the influence is unmediated by conscious thought and results from a direct perception-behavior link that operates not unlike a reflex. How might this hypothesis be put to the test? Previous research has established that exposing white participants to words stereotypically associated with African Americans tends to automatically activate the concept of hostility (Devine 1989). To find out if such exposure might also induce hostile behavior, Bargh and colleagues (1996) asked participants to perform a tedious task on a computer. Unbeknownst to the participants, the computer not only administered the task but also exposed them, subliminally, to photographs of either black or white faces. Then, after many trials, the computer presented them with a bogus error message—"F11 error: failure saving data"—and informed them that they would have to start the task again from the beginning.

Participants' reactions to this news were videotaped using a hidden camera and were rated by judges (who were unaware of the participants' experimental condition) to determine the amount of hostility they exhibited. Results indicated that those exposed to black faces did indeed respond in a more hostile, frustrated manner than those exposed to white faces.

In an extension of this work, Chen and Bargh (1997) exposed participants to photographs of black or white faces and asked them to play a game with another participant who had not seen any photographs. Ratings provided by the second, naive participant once again indicated greater hostility among those presented with black faces as opposed to white faces. Indeed, these naive participants responded to the original participants' hostility with hostility of their own, causing the entire interaction to be rated by outside observers as more hostile when the original participant had been exposed to black faces, as opposed to white.

Experimenters have shown that subliminal exposure to words related to various personality traits can influence how people judge others around them. In particular, exposure to words related to hostility, kindness, and shyness have been found to produce corresponding personality judgments.

Finally, direct evidence of subliminal influences on behavior is also surfacing from neuropsychologists who are taking advantage of recent advances in brain imaging. For example, after participants have learned to respond to an odd number with their right hand and an even number with their left, the subliminal presentation of a number (odd or even) produces cortical activation in the corresponding hemisphere of the brain (left or right). This activation is located in the motor cortex, the area of the brain that controls movement (Dehaene et al. 1998).

These experiments raise more questions than they answer. What exactly are the mechanisms that allow subliminally presented stimuli to influence behavior? Is the process indirect, as Neuberg (1988) argues, direct and unmediated, as Bargh and colleagues (1996) maintain, or both? In addition, the magnitude and generalizability of these effects have yet to be investigated. Extraordinary claims demand extraordinary evidence, and the evidence we have reviewed in this section falls short of extraordinary. Still, the topic is intriguing, and we eagerly await the results of future investigations.

What About Subliminal Advertising?

For some, the bottom line of research on subliminal persuasion is, well, the bottom line—whether the effects of subliminal stimuli can be harnessed in a consumer setting. Although we hesitate to offer any conclusions, we note that several of the critical requirements for subliminal advertising have been met through scientific research. In particular, as we have detailed, subliminally presented stimuli can influence high-level cognitive processes, and, in some cases, can even influence behavior. Nevertheless, many remain skeptical (Moore 1982, 1988, 1992; Pratkanis 1992; Pratkanis and Greenwald 1988), and it is easy to see why. In each of the studies we reviewed, care was taken to be certain that conditions were perfect: Participants were seated at specific distances from the video or computer screen, their attention was focused in just the right direction, at just the right moment, and extraneous stimuli were kept to a minimum. Such variables are notoriously difficult to control in the real world. In addition, influence from weak, subliminal stimuli is likely to pale in comparison to the highly salient and powerful stimuli already competing for our attention (Moore 1982).

The phenomena we have reviewed may well represent the hot-house products of cleverly crafted laboratory experiments, delicate flowers that would wilt in the harsh environment of the everyday marketplace. Even if this were the case, however, we hasten to point out that it would not challenge the basic validity of the studies we discussed in this article (Mook 1983). It would, instead, merely highlight the challenge of applying insights based on laboratory experiments to consumer behavior. Moreover, despite a lack of evidence for the applicability of subliminal messages to advertising, we suggest there is no a priori reason why such applications are not possible.

In sum, we offer no conclusions regarding the plausibility or

effectiveness of subliminal advertising; we only suggest that it may, in fact, be possible, and acquaint readers with the empirical research upon which we base that suggestion. To assert that it is *impossible* for subliminally presented stimuli to influence behavior—even consumer behavior—would be, not unlike the premature reports of Mark Twain's death in the *New York Journal*, an exaggeration.

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Notes

1. Note that there is a certain "tree-falling-in-the-forest-with-no-one-there-to-hear-it" paradox here: If *subliminal* means that the individual cannot identify the stimulus, how can it be shown that he or she has indeed perceived it? To accomplish this, researchers typically resort to "implicit" tests of perception, whereby the stimulus is shown to have affected the individual's judgments.

2. Unlike the pasta analogy, however, processing of the stimuli can (and does) continue beneath the level of conscious awareness, even after the introduction of the pattern mask. This continued processing is evidenced by the effects, detailed in the next sections, that these subliminal primes have on the processing of subsequently presented stimuli.

3. One of us has obtained a similar finding. After exposure to words related to conformity (e.g., *comply, follow, obey*), people were especially likely to conform to an established group norm, again without realizing that the words had influenced their behavior (Epley and Gilovich in press).

4. In fact, it appears that mere exposure effects are even stronger when the stimuli are subliminal, apparently because people are unable to correct their positive appraisals for the fact that they have seen something previously (Bornstein 1989; Bornstein and D'Agostino 1992, 1994).

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Flash! Fox News Reports that Aliens May Have Built the Pyramids of Egypt!

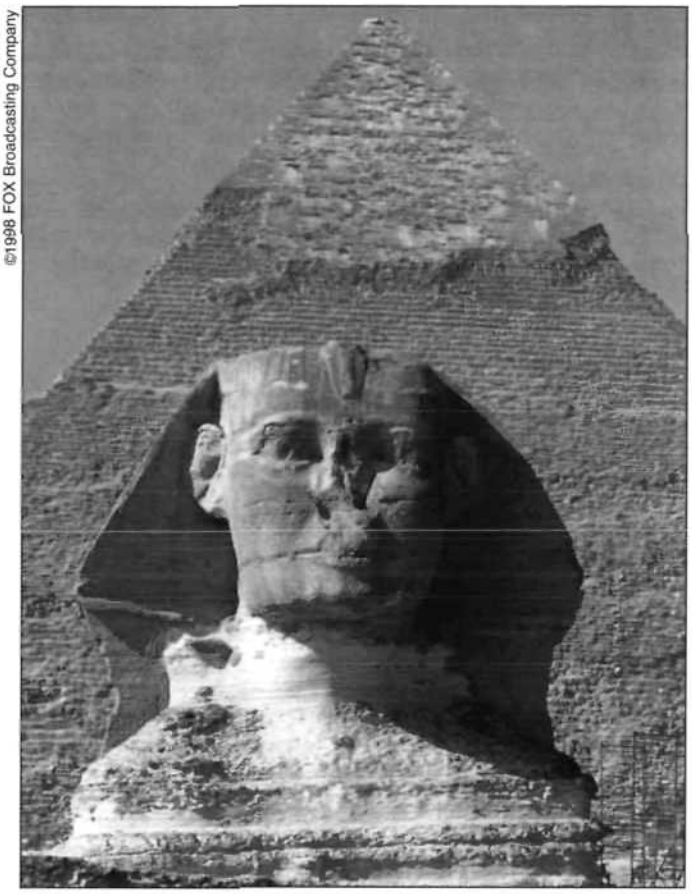
Pseudoscience as news? The Fox Network's handling of its primetime special "Opening the Lost Tombs: Live from Egypt" raises ethical questions.

RICHARD C. CARRIER

I couldn't believe my eyes. It was a Sunday night, on the ten o'clock news. Right between a report on Y2K and another on a fine against a local construction company, Fox 5 News in New York saw fit to give us a "special report" on who built the pyramids. The graphic behind the announcer, on a backdrop of the Gizeh pyramids, asks the question: "Alien Architects?" The announcer plugs the upcoming Fox television network special "Opening the Lost Tombs: Live From Egypt," then segues into the story with the campy introduction, "There are many mysteries in Egypt, like the pyramids. Who built them and how did they do it?" With that she introduces Fox News correspondent David Garcia, who begins his voice-over to video of the

pyramids: "The ancient future, a civilization of contradiction." Immediately we hear another voice in an Arabic accent, "a pyramid was a tomb," followed immediately by another similar voice, "the pyramid has never been a tomb."

This is how it begins, and it only gets worse. Besides the ramifications of this news report for the whole field of journalism—the way it was conducted, and the shoddy journalism it represents—there is the then-upcoming special that this "news report" was plugging, which aired the following Tuesday (March 2, 1999). Although that show might be excused as "entertainment," when the same thing is done on a regular news hour, amidst real news, such an excuse is inadequate. And as I eventually discovered, it would even be ethically questionable for Fox to call its live special "entertainment." One scholar who participated in it told me he agreed to take part in the show for no fee, on the basis that it was a "news" program. "They certainly used the word 'news'," he told me, "using that as the reason why 'no one' who was interviewed was getting paid." If that is true, and if Fox does claim the show was entertainment, then it is pulling a fast one.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Questionable Sources

On the ten o'clock news, after we are told that the pyramids have never been a tomb, correspondent Garcia continues, "Still, modern day scholars debate not only *what* they are, but *why* they are—who, or what, built them?" He treats both claims as if they are exemplary of real scholarly debate. Does Garcia really think that? He could not be reached for comment. Then we see a man identified onscreen as "Fadel Gad, Egyptologist." What news does he have for us? Why, just this: "Were the Egyptians thinking of UFOs at that time? Yes! A very sophisticated, highly intelligent species that had intercepted this planet Earth and had caused the evolution and the exploration of the human consciousness." A real Egyptologist is saying this? This is what Fox News is reporting. Though I later found that Mr. Gad has extensive field experience and a master's degree in Egyptology, he has authored no known publications, and is not a member of the International Association of Egyptologists.[1] But there is one more thing: Fadel Gad just happens to be a co-executive producer of "Opening the Lost Tombs." This is not mentioned in this news report. Here is a real blurring of the line between news and entertainment, with producers being portrayed as unbiased experts on news stories to drum up interest in their future entertainment programs.

The thrust of the report was definitely not skeptical. Garcia tells us that "traditional Egyptologists" consider "even the mention of UFOs or other-world intelligence [as] *heresy*," as if this were about opinion and dogma, with rival opinions as good as any other, instead of being about facts and evidence. The only skeptic presented was Zahi Hawass, "Undersecretary of State," a truly renowned Egyptologist, widely published in the field, with a Ph.D. from the University of Pennsylvania (all far more than Fadel Gad can claim). But Dr. Hawass was not listed as an Egyptologist—instead, he was identified as an establishment bureaucrat (though it wasn't mentioned, he would also be involved in the upcoming special). Hawass explains, "People like to dream. If you meet someone who is not an archaeologist, they love to dream." Recounting the claims of aliens, he concludes, "That's a dream! My job is to let you dream, *but* you have to know a little bit about reality." That is all Hawass gets to say against the ideas of Mr. Gad. No other experts or information are presented on this matter. This furthers the impression that the debate is about opinions, not facts, about heretics fighting the establishment and being arrogantly dismissed as dreamers.

Eventually, Garcia tells us, "also preserved are records, etched in stone, supporting evidence *not* of this Earth." This is a tacit approval of the alien hypothesis by a mainstream journalist on a major network's regular ten o'clock news hour. This is not a tabloid; this is supposedly a mainstream source. Yet

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there is no hint of skepticism.

What is this "supporting evidence" not of this Earth? Gad again: "The records indicate that we came from another place, we came from the stars." Do they? A picture is then shown of some Egyptian hieroglyphs resembling rings, and we hear Gad declaring "they look like flying saucers!" Then comes a picture of a carving of an Egyptian in a ceremonial headdress, followed by Gad's voice again: "They are showing figures with antennas on their head. Very mysterious." No other interpretation is offered, no one is given the chance to rebut Gad's reading of these glyphs.

Garcia finishes with a sappy catch-phrase ending, typical of this brand of TV journalism, "A higher intelligence, or merely dedicated hard work? Which theory is correct? Neither is proven. It is the mystery of Egypt," an overt declaration that the aliens theory is just as good as any other, that it hasn't been "proven" that the pyramids are man-made. If the Fox network can be this gullible, or this incompetent, or this shifty, on a subject where information and experts abound, how can anyone trust anything else they report?

By now I was dreading the Fox special. I had already found the Fox Web site (www.foxnetwork.com/egypt/) promoting all kinds of pseudoscience, uncritically, from mummy curses to aliens to psychics. No real journalism appears on the Web site at all, virtually no skepticism, and no references or authorities. Statements are made as if they were facts. The *Titanic* was sunk by a mummy's curse; the pyramids may have been built to signal space travellers; the fifty-year-old predictions of "the celebrated American psychic" Edgar Cayce suggest the pyramids were built ten thousand years ago; that the Sphinx shows damage from the Great Flood; and a secret hall of records from Atlantis would be found under it in the late 1990s—conveniently, the very time that Fox planned to explore, live on television, new shafts opened up "beneath" the Sphinx (not exactly—more like behind it).

"Forget about everything you've ever seen or heard about" the Sphinx and the pyramids, Maury Povich says as the show begins. Then there's a cheesy voice-over, asking the questions that set the tone for the rest of the show. "Are there clues to man's destiny? Was it Atlantis that taught Egypt how to build? Are we the descendants of astronauts from another world?" The entire two-hour show is littered with New Age authors pushing their theories, interspersed with more interesting archaeological tours led by Zahi Hawass. Hawass is a wonderful scientist, and clearly loves his job. He embodies the excitement of archaeology, and is eager to share it with others. Around this backbone of "reality," which included the new, "live-on-TV" discovery of an intact mummy, the exploration of an unused tomb, and the first-ever public viewing of the tomb of Osiris, the content is entirely lopsided in favor of the "heretics." The "reality" aspect of the show is also suspect; much of it seemed staged. It was apparent that Hawass had explored many of these sites before, identifying art and translating inscriptions, in preparation for the show (and then, perhaps, "setting them up" by covering them with sand). Moreover, many archaeologists, whose comments can be read in the ANE Digest archives, note that Hawass was providing a very bad example of how to conduct a dig. Some even said they would use the video to instruct students on what *not* to do.[2]

A Parade of Paranormal Purveyors

We are given a tour of all the outlandish theories at the start of the program, with longer, corresponding monologues popping in and out as the show progresses, apparently to fill dead time between setting up archaeological sites for the TV cameras. In each case an author pitches his theory, with the title of his book appearing on screen. We are thus led through the entire gamut of "heretical" Egyptology today. The narrative quaintly portrays these guys as the "doubters" and "skeptics" who are challenging supposedly tired, old views. About these theorists, who posit lost civilizations and alien visitors, Povich tells us, "their ideas, or at least some of them, are not quite as wacky as you might suspect." Indeed, "they are vigorously challenging mainstream archaeologists like Zahi Hawass." When at last we get some comment from Hawass, sanity is championed, though not permitted a fair fight. He is only given time to say the obvious: "There is no evidence at all, existing in any place in Egypt, about this lost civilization."

So who are these purveyors of the strange? First, the views of Edgar Cayce, the deceased psychic mentioned in the Web site, are espoused by John Van Auken of the Edgar Cayce Foundation. He tells us we will be enlightened by the discovery of the secret hall of records containing the truth about our past. Then there is Richard Hoagland, author of *The Monuments of Mars*. We are descended, he says, from Martian refugees who settled at Gizeh. Robert Bauval is there, author of *The Orion Mystery*. The three pyramids of Gizeh were built thousands of years earlier than we think, according to him, since they must have been aligned with the Orion constellation, which was only possible in 10,500 B.C. We get to hear from John Anthony West, author of *Serpent in the Sky*. The Sphinx, he insists, must have been built in 12,000 B.C. in order for so much erosion to have occurred (and, of course, the fact that the head was refashioned is to him further proof of its fantastic antiquity). Graham Hancock, author of *Heaven's Mirror*, makes an appearance. He believes, among other things, that "an earlier civilization" that emphasized the soul rather than technology was destroyed in a great flood, and the survivors settled in Egypt. He says we are "technologically brilliant" but "spiritually barren" and so we should look to this ancient civilization for guidance.

Who gets to speak on behalf of the real scholars? Several—but none of them are asked or allowed to comment on any of the other theories being touted on the show. Among the genuine experts, who give brief talks on ordinary facts and theories

not related to the New Age claims, are Bob Brier, an Egyptologist from Long Island University; Dieter Arnold from the Metropolitan Museum of Art; Gaballa Ali Gaballa, Secretary General of the Egyptian Antiquities Council (actually the Supreme Council for Antiquities), and, though it is not mentioned (as in the case of Hawass in the previous Sunday's news report), a leading Egyptologist with a Ph.D. from Liverpool University; Aidan Dodson, an Egyptologist (now at the University of Bristol) commenting on the King Tut dig; and Nicholas Reeves, author of *The Complete Tutankhamun*, who talks about how good forensic evidence suggests the boy king was murdered (Dr. Dodson weighs in on this one, too).

Mixing and Matching Expert Theories

The only credible expert with unorthodox ideas was Robert Schoch, author of *Voices of the Rocks*. Though not mentioned in the show, he holds a Ph.D. in geology and geophysics from Yale and has been a faculty member at Boston University since 1984. But the way his testimony is treated is part of a worrisome trend. By interweaving comments by both Schoch and West, Schoch's geological observations are depicted as supporting West. But Schoch only dates the core body of the Sphinx to around 5000 B.C. (as opposed to 2500 B.C. as is normally believed, or 12,000 B.C. as West argues), based on his estimation of the rates of rain erosion.[3]

Schoch told me he did not see the show, so could not comment on how his views were portrayed. But as far as I can tell, he certainly does not advocate West's theory, and it seems a bit shifty to present them as if they are a tag team supporting a common view. But Schoch's claims very specifically do *not* encompass the head or hind quarters of the Sphinx, and he also notes that his dating falls *within* the period of known megalith civilizations (the walls of Jericho, for example, were built in 8,000 B.C.). But this is not the theory presented on the show. Instead, the scene turns on two occasions to Schoch to argue about water erosion data, during the monologue of John Anthony West, who argues "if the water-weathering theory is correct" then there was "a very ancient and highly sophisticated" (stone carving is "highly" sophisticated?) "civilization existing at a time when no civilization is supposed to have existed." When? In 12,000 B.C. Povich then says this may be the "last monument" of a vanished civilization. When he rhetorically asks if there is further evidence, he turns immediately, not to any archaeologist or historian, but to Edgar Cayce—the psychic.

But that is not the most disturbing part of this story. Schoch is shown arguing that "there were moist periods, rainy periods, in Egypt that clearly predate the modern Sahara desert." Then at once we see West, who follows, "this kind of a rainy period prevailed in Egypt around from the time when the last ice age broke up," and thus the Sphinx had to have been built around then. There is no qualification or distinction made here between the two views. Schoch is very plainly being presented as if he is West's co-theorist. Lest we be mistaken, Povich introduced the whole segment by saying "as we have seen, many suspect ancient Egypt was influenced by a vanished genius culture. For one group, the rock of the Sphinx speaks the truth." But wait, isn't Schoch's book called *Voices of the Rocks*? This seems an almost deliberate attribution of West's odd theory to Schoch, as if his book argues for a lost civilization (it does not—it isn't even about the Sphinx, although it briefly mentions it). We are led here to believe that Schoch and West are the "one group" Maury is talking about. This is a dangerous license to be taken with serious scholarship.

There were other "experts" as well. Christopher Frayling, listed as a "popular culture historian" and author of *The Face of Tutankhamun*, tells us that "the most convincing explanation of the curse" of King Tut is that "some energy" of some kind was pent up in the tomb and released, affecting all who were associated with it. Fortunately, Dodson's account at least lets us judge for ourselves, since he reports how Lord Carnarvon died from an infected mosquito bite that was cut while shaving—a more plausible account, at least of *his* death. We are not told about any of the other "dozen" (Maury Povich) or "thirty-five" (Fox Web site) people who died under "mysterious circumstances," so Fox does not help us decide what to believe here.[4] The way Dodson's narrative is abused, however, pushes ethical boundaries yet again. Interspersed with his otherwise historical account we hear others interject fantastic comments: Povich tells us that "at the precise moment of [Lord Carnarvon's] death" there was a blackout in Cairo, and Frayling adds that Carnarvon's pet howled and died in England. Are we being led to believe that Dodson endorses this account?

Povich tells us that "at the precise moment of [Lord Carnarvon's] death" there was a blackout in Cairo. However, Cairo's power system is so notoriously bad that a blackout would not be a supernatural coincidence.

When asked, Dodson said he could not confirm any of the claims inserted into his monologue. However, he doubted that there were a "dozen" mysterious deaths, and added that Cairo's power system is so notoriously bad that a blackout would not be a supernatural coincidence. Is it ethical to splice factual statements when the speakers do not share each other's views? This is the very same thing done to Schoch. I asked Dodson if he would have liked to respond on TV to any of the claims made on the show (not just those littering his own segment). He said he would, but "with such off-the-wall ideas, it's almost

impossible to even try to rebut them. There's just no point of connection between reality and fantasy!"

This abuse is matched by yet another example. Povich introduces the "monuments on Mars" theory again later in the broadcast, adding that "recent exploration suggests it may be so." Immediately we hear a replay of a real news report, over the sight of a rocket launch. The news anchor's voice declares, "All the talk tonight is about Mars and whether American scientists have the proof that life once existed on that planet." Immediately, we move to Hoagland, and Viking orbiter images of the "face" on Mars. But wait . . . are we being told that there was a real news story about this, that "American scientists" were really asking whether this was proof of life on Mars? The *recording sure sounded to me like a report on the evidence of* microbial fossils in a Martian meteorite, but I have no way of knowing, because that part was cut out. If this is what they did, isn't this dishonest? This seems a serious ethical question.

Eventually we get to the expected tie-in with the previous Sunday's news report. Besides being told repeatedly that the Egyptian constructions were "seemingly supernatural" in their technical perfection,[5] the hieroglyphs that "prove" our extraterrestrial origins are shown again. This time, Hoagland is our interpreter, despite the fact that even Fox won't stoop so low as to claim he has any expertise in this matter. We are shown a wall inscription, which Hoagland says has pictures of "high-tech things" like "helicopters and land speeders and spaceships and the Millennium Falcon." To prove his point, the Fox production team overlays video of an Apache helicopter to show the similarity. According to Ms. Griffis-Greenberg, an Egyptologist at the University of Alabama at Birmingham, who saw this broadcast, this interpretation is absurd, but not new to her—it has cropped up on the Usenet so many times she is tired of answering it. But she was glad to explain yet again, and referred me to more credible sources.

I spoke to several other Egyptologists who were amazed that this was being done on television, although one said to me that he expects this sort of thing now, "It is just what TV does." But what do the experts say about this "helicopter" glyph? This will serve as an example for all the rest: the "helicopter" is in fact the Abydos *palimpsest.* A palimpsest is what is created when new writing is inscribed over old. In the case of papyri, old ink is scraped off, but in the case of inscriptions, plaster is added over the old inscription and a new inscription is made. The image described as a helicopter is well known to be the names of Rameses inscribed over the names of his father (something Rameses was known to do quite frequently). A little bit of damage from time and weathering has furthered the illusion of a "helicopter."[6] What we should ask is why no Egyptologists were questioned about this, something well known in the literature? As one of them said to me, "We don't live under rocks!" It would not have been hard to get an expert to clarify the meaning of the "helicopter"—they had several experts on camera already. Hawass is heard saying the claim of aliens coming from space and building the pyramids "is nuts," but he is never asked to comment on any specific details of the arguments being made. This is a very one-sided investigation. The people are not being fairly informed.

The show did conclude on an encouraging note, however. West's theory was tied to Cayce's claim of a lost hall of records beneath the Sphinx, and when the tomb of Osiris is being explored with Hawass, he is asked his opinion of the Cayce theory. His response? "It's a myth . . . but to be fair," he adds with a humorous tone, "I did not excavate this tunnel yet," pointing down a shaft perhaps leading in the direction of the Sphinx, "then really I don't know." Hopefully the audience will catch his sarcasm.

Hawass was also given (almost) the last word: "People like to dream. And I like to let them dream. But my show gives them a little of reality. I believe that all that we found today, this is the reality." And indeed he is right—for despite all the "wacky" theories, the only real facts that were exposed on the show were of that very reality: the pyramids were tombs built for mummified corpses buried only thousands, not tens of thousands, of years ago. The pyramids were built without secret history or technology; no Atlantis; no aliens; no amazing hall of records. Just an exciting, fascinating, thoroughly human, and definitely Egyptian, historical reality.

Notes

1. Fadel Gad is president of Joy Travel International (11600 Washington Pl., Suite 209, Los Angeles, CA 90066). He was travelling and could not be reached for comment. His resume cites official posts, from Inspector of Antiquities to Director of Excavations at Saqqara, excavations from 1973 to 1980, and a master's degree in Ancient Egyptian Art and Archaeology from Cairo University, 1981. He runs tours for organizations as diverse as The Institute of Noetic Sciences and the University of California, and works a lecture circuit on "Egyptian mythology." I contacted many people who met him, and all praised him as an ethical businessman and all-around nice guy. For online, mostly New Age, references to Fadel and his unusual teachings see www.visionmagazine.com/august98/artofliv.htm,www.intuition.org/journey.htm, and www.instadv.ucsb.edu/InstAdv/AlumniAssociation/Travel.

2. There was much discussion about this Fox special: see www-oi.uchicago.edu/OI/ANE/ANE-DIGEST/CURRENT.

3. See R. M. Schoch, "Redating the Great Sphinx of Giza," *KMT: A Modern Journal of Ancient Egypt,* 3:2 (Summer 1992), pp. 52–59, 66–70; T. L. Dobecki and R. M. Schoch, "Seismic Investigations in the Vicinity of the Great Sphinx of Giza, Egypt," *Geoarchaeology,* 7:6 (1992), pp. 527–544; R. M. Schoch, "L'Age du Sphinx de Gizeh: Vers Une Revision Dechirante?" *Kadath, Chroniques des Civilisations Disparues,* 81 (Winter 1993–1994), pp. 13–53).

4. See David Silverman, "The curse of the curse of the pharaohs," *Expedition,* 29:2 (1987), pp. 56–63.

5. The pyramids are still made of the most primitive of permanent construction materials (stone) and no super-technological cutting tools have been found. See also Robert Bianchi, "Pyramidiots," *Archaeology,* 44 (Nov-Dec 1991), p. 84, and Daniel Boorstin, "Afterlives of the great pyramids," *The Wilson Quarterly,* 16 (Summer 1992), pp. 130–8.

6. See http://www.finart.be/UfocomHq/usabydos.htm. See also Juergen von Beckerath, *Handbuch der Aegyptischen Koenigsnamen, Muenchner Aegyptologische Studien* 20, pp. 235–237; Omm Sety and Hanny El Zeini *Abydos: Holy City of Ancient Egypt,* 1981, p. 187; and Shafik Farid, ed., *The Temple At Abydos,* 1983, Simpkins Splendor of Egypt series, 1983, p. 8. I would like to thank Ms. Griffis-Greenberg for her help. □

The Freud Controversy at Century's End

MARK BAUERLEIN

Unauthorized Freud: Doubters Confront a Legend. Edited by Frederick C. Crews. Viking, New York, 1998. ISBN 0-670-87221-0. 301 pp. Hardcover, $24.95.

Few intellectual disputes today are as rancorous as the one between pro- and anti-Freudian historians, theorists, and therapists. Ever since Freud's ideas hit America ninety years ago, cliques have gathered to disseminate the doctrines of the master, while skeptics have challenged them to provide empirical support for those doctrines. Ignoring the empirical demand, Freudians have extended their speculations to all areas of culture, affirming not only a treatment of neurosis, but a vision of being human. Meanwhile, opponents have continued their censure, reacting with outrage and dismay to Freudians' antiscientific partisanship, disdain for protocols of inquiry and accreditation, and refusal to concede any errors made by their founding father (except those he himself confessed to).

The battle intensified four years ago, when plans for a Freud exhibit at the Library of Congress became public; the exhibit sounded like an uncritical endorsement of Freud's theories, paid for with U.S. taxpayer dollars. Adversaries demanded a less tendentious presentation, with some recognition of anti-Freudian studies. Votaries shot back, charging critics with intellectual terrorism. Critics rejoined by asking Freudians to behave more like scientists and less like enthusiasts.

As the foes skirmished in *Partisan Review* and *The New York Review of Books*, Frederick Crews assembled the essays in this collection and wrote sharp-edged headnotes to each one. Although the Freud exhibition was the immediate occasion for it (Crews's introduction details the episode), the collection amounts to a tradition of skepticism dating back forty years. The purpose of *Unauthorized Freud* Crews announces as: "to expose [Freud's] system of psychological propositions to the same kind of scrutiny one would apply to any other aspiring science."

The first section examines the "Freud legend," the narrative of young Freud struggling against prudery and positivism to ascertain the sexual origins of hysteria and devise a method of uncovering them. Contributors explode this myth of Freud's moral courage and ostracism by revealing his exaggeration of success with patients, his zealous search for confirmation of the "seduction theory," and his unwarranted concoction of the "Oedipal theory." Borch-Jacobsen reveals that Anna O., celebrated as the first great cure, entered a sanatorium one month after her treatment by Freud's colleague Breuer ended. Swales underscores the sham theatricality of Freud's ministrations to another early patient, "Cacilie M.," who suffered from "chronic hysteria" for thirty years! Cioffi asserts that Freud developed his sexual theories by projecting his preconceptions onto patients, and compelling them to accept his diagnoses.

The second section turns to "the essential knowledge claims" of psychoanalysis. Contributors analyze one of the more frustrating aspects of psychoanalysis, its conversion of any piece of evidence into corroboration of its insight, so that even refutations become merely specimens of resistance to psychoanalytic truths. Absorbing all denials, psychoanalysis has no falsifiability conditions. Instead, Von Eckhardt says, it possesses "explanatory power" (108), which Freud accepted as sufficient justification for it.

By affirming a theory on the basis that it explained symptoms, critics say, Freud provided psychoanalysis with a remarkably flexible method of inquiry. Interpretations could be judged on how satisfactorily they explained symptoms, not on how much "truer" they were than other interpretations, or how well they

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predicted future events. Furthermore, the explanatory criterion legitimated speculative tactics that supplied few hypotheses for testing—free association (see Grunbaum), dream interpretation (Sand), and sleuthing for latent meanings (Timpanaro). To these critics, Freudians draw inferences, but have no rules for validity; they claim to treat neurosis successfully, but have no methodological controls by which their actions might *not* succeed; and they implement a method that is infinitely corrigible, but never wrong.

The third section relates this epistemological problem to Freud's clinical sessions with particular cases, not to determine what really happened (as in section 1), but to explore how Freud predetermined these cases as material his theory would explain. Here Esterson, Wolpe and Rachman, Sulloway, Fish, and Stannard demonstrate that Freud's method hardly revealed a scientist carefully observing subjects and steadily building a theory of neurosis from the evidence they offered. Instead, it amounted to a haphazard series of misunderstandings, projections, and coercions, in which Freud pushed interpretations on reluctant or unfamiliar patients and evoked supportive testimony from suggestible patients eager to please the doctor, his actions licensed by the lax evidentiary guidelines of Freudian theory.

Finally, in section four, contributors examine how psychoanalysis became a worldwide phenomenon, and how Freud remained its arbiter. For Gellner, psychoanalysis triumphed because it never proposed to be a science. Rather, it was a world view, an idiosyncratic conceptual system with a unique cosmos, the analyst's office, where the patient underwent a conversion-experience. Demanding life-shaking commitments from patients and granting extraordinary powers to doctors, psychoanalysis acquired the status of a belief-system. To Farrell, however, Freud endured because of his own paranoia, a trait that drove him to investigate minor behaviors and that made him crave "heroic admiration" (235). Psychoanalysis met these needs perfectly in that it cast the analyst as master detective and attracted acolytes who worshiped its all-knowing originator. Roustang unites the faith and paranoia threads in his discussion of Freud's handling of disciples' mentoring. In International Psychoanalytic Association activities, Roustang witnesses the formation of a religion, with Freud the high priest anointing successors (Abraham, Jones) and ousting heretics (Jung). In the infamous secret Committee, formed in 1912 to monitor the progress of psychoanalysis and guard against wayward practices, Roustang discerns a conspiratorial atmosphere, with the five members vying to please their master by vilifying those who do not. Edmunds concludes with a rendition of Freud's manipulations of Horace Frink, an unstable psychiatrist whom Freud wanted to serve as his American deputy.

These incidents of malignant discipleship signal to Crews that Freud knew his theories could not withstand scrutiny, and so he turned to strategies of power and loyalty. That shift from science to police work may explain the bluntness of Crews's denunciations. For Crews, Freudians still think like disciples, investing themselves and their self-esteem in the status of Freud himself. Countervailing evidence and peer review frighten them. They regard interlocutors either as members of the fold or as enemies. Faced with that sectarian mindset, Crews realizes that reasoning has little effect, and so he opts for provocation, taunting disciples with summary judgments like "the book shows psychoanalysis to have been a mistake that grew into an imposture." If likewise impatient with the credulous disciple mentality, many readers will find Crews's elegant broadsides refreshing, and the selections in *Unauthorized Freud* cogent and satisfying.

Engaging Science About a Complex, Evolved Species

IAN MAIONE

The Honey Bee. By James L. Gould and Carol Grant Gould. Scientific American Library, New York, 1995. ISBN 0-7167-6010-X. 239 pp. Paperback.

Most readers of the SKEPTICAL INQUIRER have undoubtedly bemoaned the public's lack of understanding of science and scientific reasoning. Many of us have also known real frustration at the many misleading television shows and books that promote pseudoscience. However, exposing bad science is only half the battle; educating the public about good science is the other.

The Honey Bee is a wonderful, engaging presentation of science, as well as a fascinating look into the remarkably complex world of one of the most highly evolved species on our planet. James Gould, a professor of evolutionary biology at Princeton University, and Carol Gould, a well-known science writer, both have that rare ability to present complex scientific discoveries in detail, without either overwhelming the reader in esoteric details on one hand or oversimplifying complex issues on the other. The Goulds do not simply recite facts; they explain *why* by relating each topic to the experimental evidence. Clear and detailed illustrations help provide a picture of the complexities of real-life experiments, and make the logic behind them clear, so that the conclusions seem like pure common sense. Scientific reasoning is often described as refined, systematized common sense, and this is evident throughout the book. By the end, the reader cannot help but start thinking like the experts!

One of the excellent examples of the scientific process presented involves the honeybees' dance language, discovered by Karl Von Frisch in 1943. (Foraging honeybees communicate the location of

Ian Maione writes from Toronto, Ontario.

their finds to their sisters in the hive using a dance, in which the forager runs in a figure-8 pattern, while "waggling" her abdomen quickly back and forth. The location is encoded in the dance; the orientation of the figure-8 corresponds to the direction of the food relative to the sun, and the rate of waggling encodes the distance.)

The story is a good example of a puzzle that was gradually solved over a long period of time, with many incorrect hypotheses and wrong turns along the way. It took years before Von Frisch stumbled on the actual correlation between the dance and its meaning. The final pieces fell together only after one of his graduate students performed an experiment that got entirely unexpected results, and as often happens in real life some things don't fit into a simple model. The dances are somewhat sloppy, and there are multiple encodings of distance. In fact, Von Frisch spent much effort eliminating candidate factors (for example, height is not encoded in the dance). In contrast with typical pseudoscience, the authors explore the questions of why and how. For example, it's easy for *us* to look into a glass hive and translate a bee's waggles into a location. But how does a tiny insect do it, in the total darkness of the hive, surrounded by thousands of her sisters? For that matter, how does a bee actually judge her direction or her distance while flying mere feet above the ground? These types of issues provide excellent examples of scientific reasoning.

An entire chapter is devoted to the "dance language controversy"; the challenge mounted in the 1970s by Patrick Wells and Adrian Wenner, who attempted to show that the bees' dance is not genuine communication, and that they really use conventional cues, such as odor, to find food sources. The controversy was a classic example of the error-correcting processes in science, which thrive on debate and challenge to authority. Wenner and Wells pointed out weaknesses in both the logic that Von Frisch used and the experiments themselves. Because many of their points were well taken, a well-established theory was subjected to harsh scrutiny, and it engendered passionate debate.

To their credit, the authors present an honest view of the scientific process, with all its warts. Some of those wedded to the established view were reluctant to believe it could be wrong. The debate developed partisan sides, and personalities clashed. Some of those involved did not really understand Von Frisch's original work. Each side presented experimental results to counter those of the other, seemingly to no resolution. James Gould himself was able to finally settle the debate by designing an ingenious experiment in which foragers were successfully tricked into "lying" to recruits about food locations, something that would be impossible if the dance did not represent genuine communication. However, despite the controversy and debate, the result was a greatly enhanced understanding of bees, and this is what science is all about. As Gould himself points out, the fact that he was on the "winning" side in no way made the work of Wenner and Wells insignificant.

The authors also explore the natural history and evolution of the honeybee in depth, and those interested in the debate between evolution and creationism will find much of interest. The authors relate many aspects of bee behavior to the coevolution of flowers and their pollinators. The strategies that the hive uses in deploying its resources are explained in terms of basic economics, and these make sense as optimal strategies that arose out a of long evolutionary process.

The evolution of the dance language is a particular puzzle. Why are the dances so imperfect? (As an example, although the sloppiness of the dance appears on the surface to be a disadvantage, from an evolutionary perspective it makes sense, since dispatching hivemates to the exact flowers that have just been harvested is counterproductive. Instead, recruits are spread out in a pattern that correlates strongly with the angular size of the food patch.) Why hasn't the dance evolved in other species? How could it have evolved in the first place?

The authors devote a chapter to these questions, from Von Frisch's original speculation that the dance evolved out of intention movements, to the idea that they are a outgrowth of the bees' own mental maps. As the authors themselves acknowledge, ideas about how an animal evolved often remain only speculation without a way to test competing hypotheses. However, honeybees are one of the most promising species for exploring these questions, because of the diverse species available to compare, along with the large amount of existing data on bee anatomy, physiology, and behavior.

So, when faced with a friend or acquaintance who is wedded to the idea that aliens are abducting people or that homeopathy is a wonderful new type of medicine, and isn't interested in an explanation of abstract scientific principles, you could try, "Did you know that bees have their own language. . . ?

Travelogue of Modern Odd Beliefs

TERENCE HINES

Apocalypse Pretty Soon. By Alex Heard. W. W. Norton, New York, 1999. ISBN 0-393-04689-3. 360 pp. Hardcover, $24.95.

Apocalypse Pretty Soon is an amusing, but still serious, and highly personal, look at eight apocalyptic and semi-apocalyptic movements and their followers. Some of these movements, specifically the two UFO-related groups included, will be familiar to readers of this journal who follow the various UFO cults. The others will generally be unfamiliar, with the exception of the widely-known far-right-wing conspiracy groups. In each chapter, Heard takes the time to get to know several people who hold the belief he is discussing. He travels widely to visit groups' headquarters, interview mem-

bers, and get to know the movements from the inside out. In almost all cases, he obviously likes the sometimes very odd people he meets. The exceptions are some of the conspiracy types, whom he sees as extremely dangerous. His tone is humorous but never mean-spirited or demeaning. His writing style reminds me of P. J. O'Rourke. *Apocalypse Pretty Soon* has the flavor of a travelogue of modern odd beliefs.

The first of the two UFO groups Heard covers is the Unarians, a happy-go-lucky California-based organization. Unarian is short for Universal Articulate Interdimensional Understanding of Science, a group that obtained tax-exempt status from the IRS in the 1970s. They believe that, sooner or later, "space brothers" will come down from their flying saucers and turn the world into a blissful place for all humanity. None of the gloom-and-doom, eunuch-making tenets of the Heavens Gaters here! The Unarians sit around, channel messages from the space brothers, get in touch with their past lives, and engage in various internal organizational squabbles. The group was founded in the 1950s by Dr. Ernest Norman and his wife Ruth, the latter apparently one of the major consumers of costume jewelry in California. Her jewels are reverently displayed at Unarian headquarters.

At the other end of the spectrum is emergency-room doctor Steven Greer, a fairly well-known proponent of the view that humans are at risk for abduction by aliens for various nefarious purposes. Heard goes along on one of Greer's UFO watches. He reports, "After the initial thrills of the 'crop-circle noises,' the truth set in: we were going to sit out there all night, and it was cold" (pp. 216–217).

My vote for the oddest group goes to Tennessee Pentecostal Minister Clyde Lott and Israeli (but American-born) Rabbi Chaim Richman. They are breeding red heifers to be sent to Israel to aid in the end of the world. That's right—sort of doomsday cattle. These two believe that the second coming (Lott) or the first coming (Richman) will happen only when there is a third (historically speaking) Jewish temple built on the Temple Mount in Jerusalem. Trouble is, there's no temple there now. Worse, the place has a bunch of mosques on it. Not good. But *when* the third temple is built, the rabbis will need totally red heifers to use in various rituals and sacrifices. Since there are no red heifers in Israel now (at least none that are *really* red); these two are kindly going to the effort to provide them.

The environmental apocalyptics are given their own chapter. They tend to believe that a vengeful earth, usually in the form of the goddess Gaia, will get even with humanity for our environmental abuses by wiping us off the face of the planet. This can lead to a sort of environmental (as opposed to right-wing political) survivalist mentality, stocking up on bottled water and brie, and hiding out in a cabin in the woods.

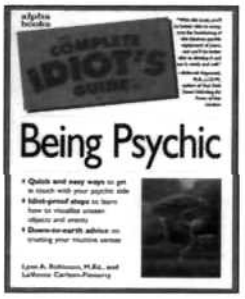
In what is clearly the most chilling chapter, Heard hangs out with some of the ultra-right-wing conspiracy types, they of Oklahoma City, Waco, and the like. Turning from this scary lot, Heard introduces us to a small band of ultra-libertarians. These folks are planning to build their own island in the Pacific and make it an independent nation. They face a number of problems, the foremost being a lack of money. Not to worry. They have a solution for the more serious problem they'll face when they do manage to build their island—how to protect it from the established nations who will, of course, want to take it over at once. No problem here—just get a couple of nuclear weapons. That'll keep everyone at bay. These people appear not so much dangerous as happily addled, much like Mary Poppins with an Uzi.

The chapter titled "Death, Be Not in My Face" covers those who plan to cheat death in one way or another. Some eat large quantities of health foods mixed with chemicals such as virazide, glutathione, and ornithine. Dr. Victor Herbert comments in the book that these chemicals will in fact *shorten* the life span of anyone foolish enough to take them. Also covered in this chapter are the cryonauts, those who have, or will have, themselves frozen just before death. The hope here is that sometime in the future medical science will have figured out how to cure the disease(s) that the cryonauts had (would have?) died of. Then they'll be thawed out and cured. Well, maybe. Trouble is that freezing causes ice crystals to form and said crystals are bigger than the molecules of water they are formed from. They're sharp, and they rupture cell membranes, which turn to mush when the frozen tissue thaws. So medical science had better learn how to repair this massive damage as well as the trivial little problem (in comparison) of curing the initial disease before any of these human ice cubes get taken out of the freezer.

In the final chapter, Heard and his wife visit the Monroe Institute in Virginia. For a price the Monroe Institute promises to teach people to have out-of-body experiences. Heard sees through the Institute's New Age gibberish, noting that "considering how much money the Institute had skinned us for already, way, way too much hawking occurred" (p. 326). But, in the end, his genuine liking of some fellow visitors kept him from just "snicker[ing] at everybody for three days" (p. 328) and leaving. In this chapter he makes insightful comments about why people accept even the most obvious rubbish, such as a tape alleged to prove channeling in which the spirit of a drowned Scottish sailor named Patrick O'Shaughnessy speaks. Heard (p. 327) says "Patrick sounded like a cross between a castrato and Mr. Bill. 'Ojjjoj,' he kept saying. 'I'm in this water and it's so cold, oooooooh!'" One visitor is dying and this stuff bolsters his belief (hope?) that he won't totally vanish from the universe.

In addition to the book, Heard has created a Web site at www.apocalypseprettysoon.com. It's well worth a visit, and his book is well worth reading.

Terence Hines is a professor of psychology at Pace University and author of Pseudoscience and the Paranormal.



Can an Idiot Be Psychic?

DAVID BLOOMBERG

The Complete Idiot's Guide to Being Psychic. By Lynne Robinson and LaVonne Carlson-Finnerty. Alpha Books, New York. 1999. ISBN 0-02-862904-3. 404 pp. Paperback. $18.95.

With one of their most recent books, the publishers of the *Complete Idiot's Guide* series may be trying to reach its declared audience. *The Complete Idiot's Guide to Being Psychic* certainly is not meant to reach intelligent or knowledgeable readers. Even most of those who believe in paranormal claims would likely have a hard time getting through the volumes of utter nonsense that fill this book.

Previously, these guides have dealt with step-by-step instructions on how to do something (buying a car, writing a resume, gardening, etc.), and parts of this book deal with how people can supposedly learn to use their intuition, get a spirit guide, etc. The authors are trying to put psychic powers in the same realm as cars, resumes, and gardens—everybody knows those things actually exist; similarly, the authors declare that everybody is psychic. They proclaim it to be real, and simply move on from there.

The authors do acknowledge the existence of skeptics, and even specifically mention CSICOP and James Randi. But their understanding of skepticism is quite skewed. They claim that skeptics have to prove "that psi doesn't exist" and wonder what they will say "when evidence finally arrives that proves psi exists as a natural force."

They also take several potshots at skeptics. In comparing the logical and rational mind versus the intuitive mind, they say the former needs proof while the latter is "trusting," and the former is "critical" while the latter is "loving." Obviously, it's better to be trusting and loving than critical! Less subtle is their claim that, before it happened, skeptics would have "been as unbelieving" of a claim that Charles Lindbergh could complete his flight as they are now of astral travel. It's hard to believe the authors didn't know they were setting up such a blatantly false straw man argument, but if that is truly what they think about skeptics, it's no wonder they vilify them as having closed minds and even say "the public may confuse these two types of extremists—fanatical followers of all things paranormal and ever-suspicious skeptics."

Oddly, the authors themselves seem to fall into the category of "fanatical followers of all things paranormal." Indeed, it's hard to believe they have not lost their life savings to a confidence artist by now, since they seem to believe absolutely everything associated with the paranormal.

They cite several well-known "psychics" to support their claims, including Uri Geller. (Amusingly, they state that "skeptics continue to debunk Geller and his feats." Since they seem to fully believe in his powers, this implies they don't know what the word "debunk" means.) They cite firewalking as an example of an "unsolved mystery," ignoring the fact that one does not need to be in any sort of special trance state to do it. They talk of hypnotically regressing people to past lives, ignoring the vast amount of evidence dealing with false memory implantation. They cite therapeutic touch and Kirlian photography as valid—the latter is even "proof that auras exist." They claim that Einstein had a "psychic experience" because he "is reputed to have formulated the Theory of Relativity while resting." They cite the Fox Sisters as having invoked spirits to "rap on and levitate objects," ignoring the fact that they later admitted it was a hoax. They perpetuate the incorrect claim that the late Jeane Dixon predicted President Kennedy's assassination. Such inaccuracies are only the tip of the iceberg.

It is intriguing that they repeatedly try to claim scientific backing for some of what they say, but don't, of course, cite anything specific. They even claim that "one thing that physicists and psi scientists agree on is that physics and psi probably follow the same set of natural laws." They appear to want to have the credibility associated with the word "scientific," without having to deal with any of the rigors of the scientific method.

The book is not completely devoid of good advice. There is one small paragraph that says, "Certain types of schizophrenics also report hearing voices, and if you start hearing voices out of the blue, your first stop should be your doctor's office. We also recommend that you make sure you're truly hearing psychic information before acting on your premonitions. And whatever you do, don't try anything dangerous because you think it's based on your intuition!" But that's pretty much the extent of it.

Their message is, quite plainly, that "everyone is psychic." Period. There is no doubt. And if you dare to question the supposedly positive results of psi studies, then you're just as bad as those who "ridiculed" Galileo, Newton, and Einstein!

Well, they certainly put skeptics in their place. Thankfully, that place is somewhere outside the realm of *The Complete Idiot's Guide.* □

David Bloomberg is the chairman of the Rational Examination Association of Lincoln Land (REALL). E-mail: chairman@reall.org.

Listing does not preclude future review.

Statistics You Can't Trust: A Friendly Guide to Clear Thinking about Statistics in Everyday Life. **Steve Campbell.** Think Twice Publishing, Box 472, 9815 S. Parker Road, Parker, CO 80134. 1999. ISBN 0-9666171-5-0. 270 pp. Softcover. $24.95. The author of *Flaws and Fallacies in Statistical Thinking* returns with this primer for helping anyone—statistical student and novice alike—evaluate claims and evidence more judiciously. Examples of the "twin devils" of poor statistics and poor interpretation of good statistics abound. The goal is to make the reader a better judge of statistical data, statistical graphics, and statistical arguments of many kinds. Says Campbell: "It will help you see through statistical information not worthy of acceptance and certainly not worthy of being used as a basis for decision making." Illustrated with cartoons by Mark V. Hall.

Prometheus Bedeviled: Science and the Contradictions of Contemporary Culture. **Norman Levitt.** Rutgers University Press, 100 Joyce Kilmer Ave., Piscataway, NJ 08854-8099. 1999. ISBN 0-8135-2652-3. 416 pp. Hardcover. $32. Rutgers University mathematician Norm Levitt, co-author with Paul Gross of the widely discussed *Higher Superstition* and co-editor of the *Flight from Reason and Superstition*, is back with another look at the foibles of postmodernism as it affects science, but this one has a far wider cast—the uneasy place of science in modern culture. "I intend to examine what to me is an unsettling, and indeed, a deeply depressing phenomenon. . . . [I]t seems to me that contemporary societies . . . find themselves still greatly ill at ease with science, puzzled by it, intimidated. . . . The uneasy relation between science and contemporary culture is deeply etched by history, custom, and prejudice, and will not be quickly resolved. The first step in that direction consists of recognizing how troubled our situation is and how much work will be required to put it right."

Science and Creationism: A View from the National Academy of Sciences. National Academy Press, 2101 Constitution Ave. NW, Washington DC 20418. 1999. ISBN 0-309-06406-6. 35 pp. Softcover. $9.95

SCIENCE BEST SELLERS

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(2–9 copies $7 each; 10 or more $6.50 each). A very welcome update of the Academy's 1984 *Science and Creationism* report and a companion to its 1998 report on teaching evolution. The 1998 report was for educators and policy makers; this one is intended for a broader audience. See News and Comment, this issue, page 8.

Strange Brains and Genius: The Secret Lives of Eccentric Scientists and Madmen. **Clifford A. Pickover.** William Morrow & Co., New York, 1999. ISBN 0-688-16894-9. 332 pp. Softcover, $14. This book "dedicated to the cracked, for they shall let in the light" is an irreverent tour of weird scientists—scientists and philosophers with strange obsessions and compulsions. In part it's a look at the nature of genius, and whether in some people their obsessions and their creativity are linked. Examples of the eccentric geniuses described are Nikola Tesla, who advanced our knowledge of electricity, and Oliver Heaviside, a brilliant Victorian mathematical physicist who replaced his furniture with granite blocks that sat in bare rooms like the furnishings of some stone-age giant. Pickover first profiles several geniuses who have obsessive-compulsive tendencies, treating Tesla in most depth. He then gives a smorgasbord of short subjects ranging from IQ to the influence of the brain's structure on behavior. In the third section, he discusses how he selected individuals for the book and summarizes his thoughts on the association of genius and strangeness, with brief discussions about the effect of other disorders such as bipolar disorder and temporal lobe epilepsy on creativity, religion, and even the alien abduction experience.

Within Reason: Rationality and Human Behavior. **Donald B. Calne.** Pantheon Books, 201 E. 50th Street, New York, NY 10022. 1999. ISBN 0-375-40351-5. 332 pp. Hardcover. $26. A distinguished neurologist analyzes the evolutionary origins, biological basis, and ultimate limits of rational thought. Drawing on findings from anthropology to zoology, Calne argues that reason is a product of biology—a tool whose power is inherently and substantially restricted. It has improved how we do things but has not changed *why* we do things. Calne offers insights into how the mind works and a compelling humanistic defense of the value of science and rationality, while at the same time showing that reason has no direct links to the brain's pathways of pleasure and satisfaction that motivate our behavior. Reason is a powerful tool put into the service of goals it cannot determine or change.

—Kendrick Frazier

ARTICLES OF NOTE

Dawkins, Richard. "The Selfish Meme." *Time*, April 19, 1999, pp. 52–53. Essay on memes—discrete units of knowledge, gossip, jokes, and so on that are to culture what genes are to life. Adapted from Dawkins's introduction to Susan Blackmore's new book *The Meme Machine* (Oxford University Press).

Donnelly, Fred. "Edgar Cayce: Let Sleeping Prophets Lie." *Saint John (New Brunswick) Times Globe*, April 13, 1999. P. A1. Column by historian shows how Edgar Cayce's "predictions" for the year 1998 failed. New York and Japan are still above sea level. No continental-size land mass is bubbling up in the middle of the Atlantic Ocean. "Any rational observation must conclude the prophecies are definitely false. . . . Edgar Cayce had a great imagination but was certainly no prophet."

Elitzur, Avshalom C. "Can Skepticism Itself be Dogmatic?" *Frontier Perspectives*, 8(1):44–45. Spring 1999. A response by a member of the Center for Frontier Sciences' executive board and its publication *Frontier Perspectives* editorial board to Martin Gardner's SKEPTICAL INQUIRER column last year highly critical of the quality of science presented by the organization and its newsletter. Elitzur says the journal has now become fully peer-reviewed and has assembled new Advisory and Editorial Boards. He says Gardner's report presented "a highly partial picture" of the Center's activities and *Frontier Perspectives*' content but expresses hope that it will make the beginning of a dialogue between skeptics and "fringe scientists" (his phrase).

Holden, Constance. "Subjecting Belief to the Scientific Method." *Science*, 284: 1257–1259, May 21, 1999. A welcome examination of the John Templeton Foundation and its program to try to bring a rapprochement between science and religion. Templeton stages conferences, offers prizes, designs courses, sponsors programs including the one on science and religion at the American Association for the Advancement of Science, and even funds research. It is responsible for a fair amount of the "science finds God" media publicity of the past year or so. Some scientists welcome the foundation's efforts, but critics find Templeton's agenda futile, if not deceptive. The article drew much comment subsequently in the Letters column of *Science*, 284:1773–1774, June 11, 1999, including letters by evolutionary biologist Francisco Ayala and physicist Steven Weinberg correcting comments about them and by biologist Ursula Goodenough expressing "bewilderment" at the proliferation of Templeton's programs and by its frequent "about-faces." She urges great caution over "the fact that a billionaire can attempt to wield this much influence."

Kriostof, Nicholas D. "Scientists Offer Explanation for Alien Abductions." *New York Times*, July 6, 1999. In numerous articles over the years, SI has suggested that many "alien-abduction" reports may be due to misinterpretations under sleep paralysis. Now this fine article on the subject concurs that the sleep-paralysis disorder—the result of a disconnect between brain and body as a person is on the fringe of sleep—may indeed be responsible. "A growing number of scholars believe that sleep paralysis may help explain many ancient reports of attacks by witches and modern claims of abduction by space aliens." A number of psychologists who study sleep paralysis are quoted.

McCracken, Samuel. "The New Snake Oil: A Field Guide." *Commentary*, 107(6): 24–31, June 1999. A lengthy critical assessment of alternative medicine, from homeopathy and acupuncture to reflexology, "bodywork," holistic dentistry, colonic irrigation, and so on. The author points out that for the great majority of alternative therapies there not only is no scientific validation of any kind, there is frequently evidence to the contrary. Why, then, are people so enamored of it? At least one explanation, writes McCracken, is the extraordinary influence of "the one-man industry known as Andrew Weil, M.D., whose effectiveness as an advocate would be hard to exaggerate." Another is the unfortunate legitimization given it by the formation of the government-funded National Center for Complementary and Alternative Medicine. The author worries that the "severely relaxed standards of evidence that disfigure" the alternative medicine enterprise threaten to contaminate medical schools now accommodating new programs in alternative medicine.

Miller, David. "Being an Absolute Skeptic." *Science*, 284:1625–1626, June 4, 1999. Science and Society essay by University of Warwick philosopher makes for fairly heavy going. Says Miller: "What is central to rationality is criticism, not justification or proof; and to scientific rationality, empirical criticism. To rescue science as a rational enterprise, perhaps the rational enterprise *par excellence*, there is accordingly no need to attribute to well-tested scientific hypotheses a security and reliability that they do not possess." Miller calls on scientists to stop overlauding scientific rationality, to show greater readiness to admit to ignorance, and to moderate public expectations of what can be accomplished by science. The July 9 *Science* (285:199–202) published six lively letters in response to Miller's essay (including an excellent one by Nobel laureate biochemist Christian de Duve), plus a long response from Miller, who says his purpose was "to distinguish skepticism from relativism, to applaud the former and to deplore the latter."

Shah, Tahir. "Unholy Smoke." *Geographical*, 71(1):36–39, January 1999. Thousands of "godmen" in India make their living performing "miracles" that Shah says would be quite familiar to Harry Houdini. He also interviews Dipak Ghosh, a leader of the Rationalist movement in India.

Silber, Kenneth. "Is God in the Details?" *Reason*, July 1999, pp. 23–28. Excellent inquiry into the need to inject a note of reality into public discussion of a topic that has run far afield of the relevant science—the widely trumpeted assertion that there is an apparent "fine-tuning" of the laws of physics without which humans cannot exist. A good evaluation of claims recently reiterated uncritically in *Newsweek*, *The New Republic*, a George Will column, and in the 1997 Patrick Glynn book *God: The Evidence*. Silber starts with physicist Victor Stenger's computer-simulation experiments showing that small changes in the constants of nature provide different kinds of universes but not necessarily ones alien to the development of stars, galaxies, and life. Has physics found God? The evidence is, at best, highly ambiguous, says Silber. "Some of it points in an opposite direction—toward a universe that can appear marvelously fine-tuned even if there is no Fine Tuner."

Stashower, Daniel. "The Medium and the Magician." *American History*, August 1999, pp. 38–46. Mina Crandon's followers believed she had genuine paranormal powers. Harry Houdini was equally certain she was a fraud. A recollection about Houdini's investigations into the woman called "Margery the Medium."

Vikan, Gary. "Debunking the Shroud: Made by Human Hands." *Biblical Archaeological Review*, 24(6):27–29, November/December 1998. Defenders of the Shroud of Turin have argued that it doesn't look like the art of the Middle Ages. Vikan argues that this is because the artist was attempting to create, not a painting, but a supposedly miraculous relic. In a sidebar Walter C. McCrone relates how he tested thirty-two samples from the shroud in 1980 and found paint, not blood.

Voss, David. "'New Physics' Finds a Haven at the Patent Office." *Science*, 284: 1252–1254, May 21, 1999. Report on how dozens of recent patents have been awarded for devices that invoke principles outside accepted science, such as exotic nuclear physics, perpetual motion machines, and psychic forces. The Patent Office, once considered a barrier against bogus scientific claims and devices, is staggering under a record onslaught of patent applications and a shortage of qualified examiners. And some inspectors are themselves devotees of fringe technology. As a result, patents are now slipping into the books that would never have made it before. In the letters column of a subsequent issue of *Science* (284: 1829–1832, June 18, 1999), several of the holders of patents criticized in the article strongly protest Voss's characterizations.

—Kendrick Frazier and Robert Lopresti

SUBLIMINAL PERSUASION
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Dowsing Successful

H.-D. BETZ

In a recent issue of SKEPTICAL INQUIRER, J.T. Enright (1999) repeats criticism (Enright 1995) on one of our dowsing studies, the Scheunen-Experiment ("nothing but random results") and generalizes his negative opinion to all dowsing effects.

In fact, our initial analysis of 843 double-blind trials with forty-three operators yielded considerable statistical significance (p=0.0007; see Betz 1995), although the individual hit-rate turned out to be exceedingly small. Enright (1995) does not find an error in our analysis, but argues that it was customized afterwards and thus not valid; other evaluations would not give significant results. In a rejoinder Betz et al. (1996) showed that the initial analysis remains valid and other statistical procedures yield significance as well. In particular, Ertel (1996) presented a completely different evaluation which reveals very high statistical significance. Although none of these calculations were shown to be incorrect, Enright continues to debate the data.

Ertel's analysis (1996) of the barn-experiment was presented to Enright prior to publication. From January to March 1996 an extensive scientific exchange occurred between Enright and Ertel. In continued e-mails with data attachments Ertel answered numerous questions in great detail. I was kept informed by Ertel, because several aspects of the data had to be clarified, and Enright was aware of this connection. Finally, on May 27 Enright mailed: *the matter is resolved*, indicating that his doubts regarding our data and Ertel's way of handling them were removed. Not the faintest objection had he raised to our study. This is what I forwarded in a talk given at that time (but published much later), now criticized by Enright. We could hardly anticipate that he would tear his own message to pieces.

Incidentally, precisely this critique was put forth in 1998 in the German journal *Skeptiker* (2/1998); my rejoinder and clarification appeared shortly thereafter (3/1998).

Enright presents in his figure 2 the best run (consisting of ten trials) we ever obtained and attributes the effect to chance alone. The probability against chance is 0.2 percent (Betz et al. 1996). More important, at three other sessions this operator performed three additional runs (ten trials each) and reproduced his success. When all forty trials are combined the probability against chance is still below 5 percent. We did not evaluate the fact that this operator operated unchallenged for more than 10 years as a highly successful water dowser (Betz 1995).

Enright notices quite correctly that the best operators produced not only notable hits near the ideal hit-line (x = y in Figure 2, 6a and 6b), but also concentrated data points near the mirrored line x = -y, clearly evident by visual inspection of the graphs. This is precisely the reflection-effect already extracted by Ertel in his analysis (1996) of the total data, statistically highly significant. Enright terms this loosely *anti-dowsing skill*, but did not make clear whether he admits trends towards a nonrandom effect or interprets this skill as a demonstration that dowsers do not even *reach chance results* (note the well-known misinterpretations of psi-missing).

Giving a *simple alternative strategy* Enright repeats his false statistical interpretation which we have shown to arise from his misconception of null hypotheses (Betz et al. 1996). He claims seriously that *dowsers could perform better if they—as successful strategy—simply choose the midpoint in each trial, instead of attempting to dowse.* Even a nonexpert readily recognizes the two conflicting assertions: on the one hand Enright claims all along that dowsers perform according to chance. On the other hand, he suggests that just these operators by using a (necessarily) random strategy will perform better than by chance.

For strange reasons Enright continues to claim that we had selected the forty-three operators from some 500 candidates by performing thousands of preliminary tests, thereby arranging optimal stimuli for each dowser. Nowhere did we say so. It is absolutely clear that such an undertaking would have been impossible to carry out.

Enright claims that operators produce only random results and we have always admitted that the effect tested in the barn is extremely small. It remains Enright's secret how one singles out the best operators when there are (nearly) no effects which can be used as selection criteria. In fact, the forty-three operators were never selected due to preliminary tests; they came along, performed, and went away. Our final result was not obtained until the complete data was analyzed.

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The Whole Truth

J. T. ENRIGHT

I begin here with only a few of the *many statements of Professor Betz's* rejoinder, restricting myself to the three most offensive ones.

1) Despite Betz's assertion to the contrary, I have never, in correspondence of any sort, or even in casual conversation, granted the validity of the analyses undertaken nor the conclusions drawn by Betz and coworkers from the Munich dowsing experiments. Betz has made the same insulting accusation elsewhere (Betz 1997) over a year ago. He must have (Betz and Enright 1998) misunderstood a remark of mine made to Ertel, but I cannot guess which one. More specifically, none of my e-mail messages to Ertel contained either the word "matter" nor the word "resolved," let alone that my last message to Ertel of March 26 (not May 27!) contained both. I know of no e-mail exchanges whatever with Ertel or Betz in May 1996. It is noteworthy that in the past year, Betz has not produced the text that led him to his beliefs. Instead, I stand by my original conclusion: A more misguided application of statistical analysis, leading to unwarranted conclusions, is difficult to imagine. This is a hallmark example of the fact that just about any set of data can be sufficiently tortured so as to support the interpretation of choice. Statisticians sometimes call this "data mining." A clear-cut demonstration of the actual nature of the results from the Munich experiments, independent of statistical manipulation, is instead provided by figure 1 here (figure 3 in Enright 1999). If dowsing were a genuine phenomenon, a cloud resembling the Milky Way should appear in this graph, a dense aggregation of points stretching from lower left to upper right. Such a pattern can only be detected there by wishful thinking.

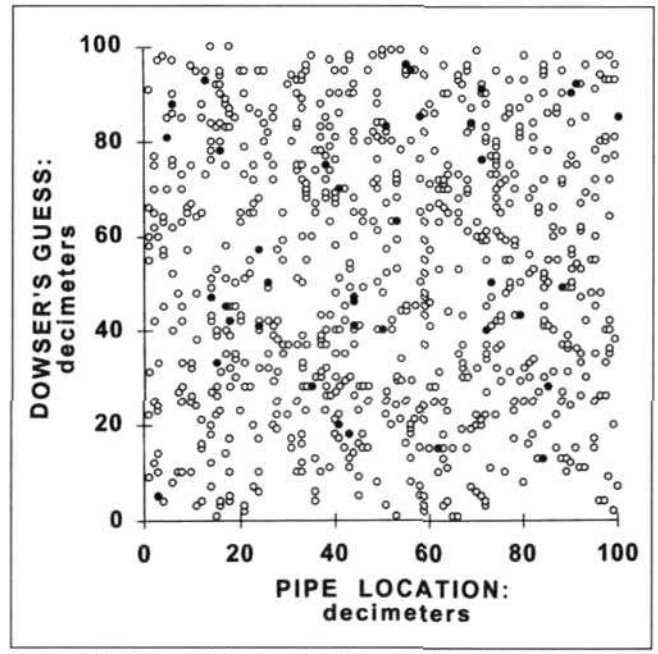

Figure 1. All 843 test results' reported by Wagner et al. (1990) for the 43 dowsers, selected by the researchers from among nearly 500 candidates. (Filled circles: two data points at identical coordinates.)

2) Betz asserts that they nowhere said that data were used from only forty-three dowsers out of about 500 candidates. Not so: The final report, which provided data on only forty-three dowsers, says: "... werden die etwa 400 Versuchspersonen aus der früheren Pilotstudien nicht berücksichtigt" [In translation: "... about 400 candidates from the preliminary experiments were ignored," p. 31 in Wagner, Betz, and König 1990]. I concede, however, that I cannot document my inference that those neglected 400 probably didn't do well in the pilot studies.

3) Betz accuses me of a misunderstanding about null hypotheses, in my demonstration (figure 7 in Enright 1999) that even the six "best" of the dowsers could have done better than

they actually did with dowsing rods by simply guessing in each trial that the pipe was located at the test midline. That conclusion is an empirical fact; no hypothesis of any sort is involved.

A Broader Overview

My sympathies go out to the German taxpayers, whose government paid a large sum (ca. $250,000) for the Munich dowsing studies. At issue here is whether those charged with spending public money behaved in a responsible fashion. In my opinion, they did not. Properly interpreted, the results only confirmed what had been found often before, namely that dowsers cannot do what they claim; but Betz and colleagues have twisted that conclusion about 180 degrees to fit their pre-existing beliefs, and have subsequently slandered their opponent. They should instead have emulated the experts who concluded nearly a century ago, after examining the vast prior literature on dowsing (500+ publications):

> ". . . it should be obvious to everyone that further tests by the U.S. Geological Survey on this so-called *'witching' for water, oil or other minerals* would be a misuse of public funds." (Ellis 1917).

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Note

1. Pearson's correlation coefficient for these data is 0.022. Larger values should be expected *from random processes more than 70% of the* time. Pipe location accounts for less than 3% of the variation in dowsers' guesses. If the true correlation were even 0.15, power to detect a significant ($p < 0.05$) estimator (which did not occur) exceeds 99%. Similar interpretations apply to Spearman's correlation coefficient, which is 0.021 and which makes somewhat weaker assumptions.

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Rupert Sheldrake and the Objectivity of Science

RICHARD WISEMAN and CAROLINE WATT

Controversial biologist Rupert Sheldrake has recently published surveys suggesting that much of the current research in science may suffer from an important methodological problem that could seriously challenge the validity of many scientific findings. This article sets in motion a project designed to assess the impact of Sheldrake's provocative findings.

Sheldrake (1998a, 1998b) has reported that a substantial proportion of scientists are neglecting to use blind methods. This may result in experimenters' hypotheses becoming self-fulfilling prophecies by biasing the way data is collected, analyzed and interpreted. Psychologists have demonstrated the potential for such effects by carrying out studies in which experimenters primed with different beliefs (e.g., "we expect people in Group A to have a lower IQ than those in Group B") inadvertently influence their participants and observations in such a way as to make the results of their experiment conform to their initial beliefs (Rosenthal 1976; Rosenthal and Rubin 1978). Such "expectancy effects" may be of enormous importance, rendering the results of an experiment completely worthless. Fortunately, expectancy effects can be reduced by ensuring that studies are carried out by people who are blind to the experimental hypotheses and design.

To discover whether scientists are using sufficient safeguards against possible experimenter effects, Sheldrake recently surveyed more than 1,000 journal articles in both the social and natural sciences. He reports that no experiments in the physical sciences, and only 0.8 percent in the biological sciences, were conducted blind. Only 4.9 percent of studies of human and animal behavior used blind methods. Sheldrake's survey raises several important questions and, perhaps not surprisingly, provoked considerable controversy (Letters, SKEPTICAL INQUIRER, 1998; Matthews 1998). Are so few studies really conducted blind? If so, are experimenter effects a real problem or do most modern methods eliminate the possibility of such bias? Astonishingly, until now there seems to have been little systematic attempt to answer these important questions.

Richard Wiseman is in the Department of Psychology, University of Hertfordshire, U.K. Caroline Watt is in the Department of Psychology, University of Edinburgh.

We are currently setting up a worldwide initiative involving scientists from many different countries and disciplines to identify areas or techniques that may be susceptible to expectancy effects. Once potentially susceptible areas are identified, we will carry out systematic interdisciplinary research that will examine whether such effects represent a real problem for science. If we discover that expectancy effects are more pervasive than previously thought, science will gain through resulting methodological improvements. If existing methods are not susceptible to experimenter effects, this will provide the previously lacking confirmation and validation of current methods. Either way, science will benefit.

We are now inviting all scientists to suggest areas and techniques that might be susceptible to expectancy effects. We are especially interested in techniques that involve considerable manual handling by experimenters, that involve subjective observations and measurement, or that require substantial training and experience to develop reliable results. We are also interested in hearing from scientists who would like to become involved in testing this important question, for instance by comparing the outcome of blind versus not blind methods in their own research.

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Response to 'NAGPRA, Science, and the Demon-Haunted World'

Of all articles in the May/June 1999 issue, anthropologist Geoffrey A. Clark's article "NAGPRA, Science, and the Demon-Haunted World" provoked the most controversy and comment. We begin with a letter from the supervisory archaeologist of the Navajo Nation Historic Preservation Department and Clark's response to that, and then follow with other selected letters from readers.

— THE EDITOR

In "NAGPRA, Science and the Demon-Haunted World" Geoffrey Clark rails against straw-demons from the highest rampart of the ivory tower. However, his naive assumptions, rigidly compartmentalized perspective, and his almost religious devotion to science render his commentary uninformed and isolated from the real issues or the real world. As a social science professional (non-native) working for an Indian tribe active in the implementation of NAGPRA, I point out several problems with Clark's perspective, assumptions, and conclusions.

Clark assumes that all Native American concerns involving human remains also involve, essentially, ghosts. He's simply wrong. The central concern in Native America involves respecting a wide range of

Geoffrey A. Clark

inseparable traditions and protecting real cultures consciously struggling to resist assimilation into an American monoculture. While "ghosts" may make for catchy headlines and help to fill the hall at professional meetings, they've had almost nothing to do with the development or implementation of NAGPRA. This mischaracterization of the law belittles not only Native American communities, but those who supported and passed the law, and the professionals who are now implementing it. *NAGPRA* was not enacted to exorcise poltergeists, it was passed out of respect for the cultures, traditions, and repeatedly expressed concerns of the Native American descendants of the people whose bones and belongings have been crated off by the tens of thousands to universities and museums near and far.

After assuming that ghosts are behind NAGPRA, Clark dismisses respect for Native American culture and traditions as irrelevant, absurd, or quaint. Meanwhile, he pretends that his own conceptions are unbiased and untainted by culture or self-interest. Yet these influences are easy to spot. For example, full implementation of his arguments would result in an unfettered, strictly materialist science ("no topic or question is off limits") unhindered by such "pernicious vanities" as ethics, privacy, human rights, or past abuses.

Clark acknowledges as "fact" that "Indians . . . subscribe to the same essentialist notions of ethnicity as . . . the government, or Americans in general." But since he conceives the issues differently, we must all be wrong. He also acknowledges some exclusive Native American interests in human remains, saying: "We are all the losers if, for reasons of political expediency Indians rebury *their* past" (emphasis added). In reality Americans, the government, and Indians have concluded that we all ultimately *gain* when we act to respect Indian people, Indian tribes, and *their* right to *their* traditions.

Under strict materialism, the "rights" of science that Clark asserts are, in his own vocabulary, absurd, nonmaterial, epiphenomena that do not and cannot exist. Why then, I wonder, is he so worked up? Could it be that he fears some of the very demons he has so logically and emphatically dismissed? Perhaps such phantasms (along with haunting concepts like ethics, human subject protections, and applied science) do indeed lurk, but only in the nonconforming ether outside the insular ivory-tower reality that has been created, and is now maintained and enjoyed by academic-only science and its denizens.

Clark's faith in Darwinian evolution is limited to the material and tangible. He then abandons both Darwinian evolution and the principal of uniformitarianism and ignores the obvious conclusion that culture participates in adaptation and evolution and has contributed directly to the success of our species. In dismissing culture, Clark not only truncates the evolutionary history of humanity just when it gets interesting, he also severs the ties between his archaeology and the sum of this century's anthropology. He even turns on the field, implying that its principal subject serves little function beyond the quaint. The underestimation of the role of culture is materialistic science at its most duplicitous and dangerous. Any argument that concludes that science has rendered culture, cultural evolution, or cultural components like norms, morals, values, the teachings of elders, traditions, or history irrelevant is more than simply arrogant, it is seriously flawed and fundamentally risky, *especially* given the implications of Darwinian evolution.

I propose that in making decisions that affect people, we must continue to defer to an older, enormously complex and perhaps messy Human Culture before buying into an extremely rigid Science Culture that is only partially and recently developed and unproven. I think that Clark would have us accept science as the new dogma that must now rule our values and guide our behavior. But science (at its most self-righteous) pretends to be about what is *true*, and *not* about what is *right*. Broader culture—political culture, economic culture, traditional culture—will and must continue to serve as the forum for determining what is proper and appropriate and will and must continue to put limits on any number of possibly harmful behaviors, attitudes, and agendas including a potentially renegade and fascist (or at least stridently valueless) scientism.

Peter T. Noyes
Window Rock
Navajo Nation, Ariz.

G.A. Clark responds:

In his letter about my NAGPRA essay, Peter Noyes goes off on a tangent about ghosts, and then gets down to the nitty-gritty—the conflict between the world views of science and religion. Although I don't think he understands it, Noyes does not take issue with my contention that religious ideology underlies, or warrants, NAGPRA legislation, but this is, in fact, central to my argument. In the brief space allotted me, I make four points.

First, it is entirely legitimate for science to ask why humans have religious beliefs, since there is no empirical support for them. There is a broad consensus in evolutionary psychology that the "sacred" or "spiritual" (most broadly, the "non-material") arose as a consequence of brain evolution over the

course of the Pleistocene as hominids, with their slowly expanding cognitive capacities, tried to make sense of their experiential worlds. For better or worse, this heritage is with us yet. Religious beliefs are, indeed, "curious survivals" of earlier cognitive evolution. Their predicates and entailments exist only in the human mind.

Second, Noyes invokes exactly *the same kind of simple-minded, pre-scientific, essentialist, typological thinking that saturates NAGPRA issues and, in fact, all public discourse about race and ethnicity in the US (and elsewhere). I have little patience with this. Just exactly what* is *an indian, anyway? A white, a black, an anglo etc.? The point is that race and ethnicity are fleeting, transient things, not bounded in space and time (polythetic sets, if you will, that are constantly changing, that have only a statistical reality). Evolutionary biologists and some anthropologists actually know what "race" and "ethnicity" are; Americans in general, our policymakers, and most American archaeologists don't. Like many unapologetic (but well-educated) 1960s liberals, I believe that the basic unit of social value is the individual, and not some collectivity of individuals like a racial or ethnic group, a family, a fellowship, or even society as a whole. It's about time we stopped using nineteenth century notions of biological and cultural variation as a basis for twenty-first century public policy.*

Third, Noyes seems to forget that anthropology is a "natural" as well as a "social" science, and that all human behavior is determined by the interaction of biology and culture. It is a severe defect of the Americanist anthropological research tradition that the latter has been emphasized to the near-exclusion of the former (such is not the case in the UK, for example). All humans are "stone-agers in the fast lane," and their behavior is as much affected by 5 million years of evolution as it is by the silly notion that we are—by virtue of "culture"—somehow removed from the rest of the natural world.

Finally, it should be evident that indians cannot be "sovereign nations" and "wards of the court" at one and the same time. But this is, in effect, their current legal status, for which they pay dearly in terms of socioeconomic opportunities and "quality of life" issues. It is my opinion that the legal status of indians is anomalous under the law, and is long overdue for, and badly in need of, an overhaul.

G.A. Clark
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Tempe, Ariz.

As an anthropology student (studying archaeology in the post-NAGPRA university setting), I must wholeheartedly agree with Geoffrey Clark's conclusions in his article "NAGPRA, Science and the Demon-Haunted World." Most of my peers in my archaeology classes are of the opinion that race and ethnicity (which are illusory) are somehow real and vitally linked to culture, and that culture is of supreme importance in understanding the past. That is to say that only people of the same culture can accurately understand one another. And, since many Native American groups believe that their cultures have continued without substantial change for the millennia, it follows that only Native Americans can accurately interpret pre-Columbian human remains and artifacts.

An example of the ridiculousness of following NAGPRA to the letter can be evinced in the following example set forth, seriously and in a positive light, by one of my professors: If a 6,000-year-old artifact or human bone is found in lands currently claimed by tribe "A," then tribe "A" must be consulted about the find and excavation. This is true even if it is known that tribe "A" only moved into that area 1,000 years ago!

Again, kudos to Geoffrey Clark for calling attention to the problematic nature of NAGPRA, a law that encourages any (Native American) cultural belief to be taken, for the sake of political correctness, as equivalent to scientifically derived fact.

Craig May
Eugene, Ore.

Geoffrey Clark is quite right about the racialist and antiscience roots of the Native American Graves Protection and Repatriation Act, and the resulting damage to information about the past. I would expand on three points.

1) NAGPRA finds a lot of sympathetic ears because, despite wide acceptance of autopsies, forensic examinations, and organ transplants, most Americans can be convinced that studying ancient human remains is "disrespectful." This is because most people refuse to admit the finality of death and cannot shake the irrational belief that something of a human exists after death that can be offended or damaged by an interference with the dead body. As an archaeologist and scientist, I refuse to accept that, and further point out that studying people and their remains is one way to respect them.

2) NAGPRA is subtly racist. It would not have passed had not many politicians and much of the public been willing to buy into the argument that "Indian archaeology is their archaeology, and we can let them have it and destroy it by reburial because it doesn't matter, it's not an important part of the real American past." This same thinking produces looters who destroy sites for salable artifacts, and developers who think nothing of bulldozing ancient villages to put up shopping malls. Archaeologists believe that the past is not "red" or "white" or "black" but *human*— and all human pasts are worthy of understanding and have something to teach us.

3) Why should non-archaeologists care about NAGPRA? Because it is an exceptionally dangerous legal precedent. Federal law (and many similar state laws) now says that certain minority groups, vaguely defined by religion and ethnicity, have the right to forbid the study and control the disposition of certain kinds of scientific evidence. Think about the implications of that for a while.

John Whittaker
Department of Anthropology
Grinnell College
Grinnell, Iowa

With regard to Geoffrey Clark's article lamenting NAGPRA, I would offer the following:

> "Good friend, for Jesus sake forbear
> To digg the dust encloased here;
> Blest be ye man who spares these stones,
> And cursed be he who moves my bones."
>
> *—Epitaph on Shakespeare's tomb*

> "Are those trees straight? Mister, those trees are so straight that they lean the other way." (New England saying)

These seemingly unrelated items point up the source of Professor Clark's chagrin. First, excavating burial sites has always been a subject of concern, and not unreasonably so. Second, the Federal government has in the past treated Native Americans (to use the politically correct term) cavalierly, to say the least, and is now attempting to straighten up by leaning the other way. NAGPRA is but one result of this "lean the other way" philosophy. Affirmative action is another. It would appear that the operative philosophy is that we can correct the

fact that some people were less than equal by making them more than equal, and to hell with the Constitution.

Jerry F. O'Donnell
Las Cruces, N.M.

Geoffrey A. Clark wrote a fine piece on the problems with NAGPRA. His essential points are well taken. He also put his own bias cards on the table, which is admirable. He says he is "a materialist to the core," and *defines materialism as "the idea that only* matter exists and that what we regard as 'mind' or 'spirit' consists exclusively of matter arranged in complex ways."

Scientific materialism is probably, maybe even obviously, the dominant view of the readers of this publication, so it all fits well enough. It is not the only view, though: there are other perspectives, arguably worthy of respect.

Professor Clark contrast science with religion and says that science looks for truth based on reason and evidence, while religion (at least what we think of as religion) relies on authority of one stripe or another. No argument here. Reason, insistence on falsifiable propositions and reliance on evidence account for much of the progress humans have made, while religion is mostly characterized by dogma, systems of belief. Science truly can be seen as a "candle in the dark," as Carl Sagan put it. Contrast scientific materialism with the mythic belief structures of the various religions and you observe a wide chasm indeed. The two realms really belong to different historical eras and to different levels of consciousness, *and there is no question as to the power of* scientific rationality to develop knowledge.

Science and its offspring, engineering, have become so successful, though, that a huge error has occurred. Science in many quarters has degenerated into "scientism," the belief that there is no reality save that revealed by science. There is, however, another possibility, which is that, while rationality and the scientific method have pushed aside myth in the area of knowledge claims, there are aspects of reality that myth has attempted to apprehend, and with which science cannot deal. Rehabilitation of the mythic is not the answer, but direct experience is. . . .

David Lagerman
Plymouth, Wis.

When I read Geoffrey Clark's article I was left with two distinct feelings: empathy for his main point and disdain for an unnecessary and vitriolic attack on anything opposed to his opinions.

I agree that NAGPRA appears to be yet *another in the long line of well-intentioned* pieces of federal legislation that later prove to have negative consequences. It would appear that a law that has such a sweeping impact on legitimate research deserves critical review.

Having said this, I could not help but feel that Clark dipped deeply into the well of arrogance in his screed. Clark bypassed a meaningful discussion of the philosophy of science by declaring that "there is only one scientific view" and that "materialism" is the underpinning of all science. Whether or not he is correct in his ontological "preconceptions" (his word) is not at issue; the fact that he ignored the many legitimate scholars who would at least acknowledge that not all ontological questions have been decided is.

Clark peppered the piece with with universals such as "one cannot cannot simultaneously understand and accept evolution . . . and sustain a belief in the nonmaterial" and the reminder that, to the materialist, religious belief is "absurd."

The diatribe went down from there. His *personal belief that* ". . . science and religion are fundamentally incommensurate" is asserted so gratuitously as to invite a playground-like retort of "Oh, no they're not!" Perhaps most striking is the apparent underlying theme of the piece: His right to research supersedes your right to exist. This is most clearly evident in the disdain he showed for "Indian origin myths" and his conviction that the concerns of science should take precedence over anything as trivial as the religious beliefs of Native Americans. Perhaps if such confrontationalism and arrogance were not so prevalent, questionable statutes such as NAGPRA would not be either. More important, how does such writing contribute to the "Skepticism of Inclusion" (March/April 1999) that Kendrick Frazier argued so well for recently?

David Matthew Zuefle
Greensboro, N.C.

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G. Clark's article crossed a line that you are ordinarily careful to respect, namely that of not attacking religion and religious beliefs unless they intrude upon the purview of the properly named "The Committee for the Scientific Investigation of Claims of the Paranormal" (CSICOP), and then only in challenging specific, testable claims with evidence to the contrary. . . .

Clark's diatribe against religion comprised a prominent portion of his text. Many statements illustrating this were present, such as "A theological investigation . . . starts with a conclusion," "religious views . . . are absurd," "religious tenets . . . are ex post facto rationalizations for existing social conditions," "The world views of science and religion are fundamentally incommensurate," and didn't seem to me even germane to the bulk of his discussion on NAGPRA as I understood it. . . .

So why are we treated to a bombast against all religion, sure to offend and alienate the sincerely religious among SI's readership, without advancing the agenda of those with legitimate concerns about the effect of NAGPRA on the science (or as Clark prefers, the "science-like" endeavor) of archaeology?

David M. Larue
Computing and Networking
Colorado School of Mines
Golden, Colo.

I was struck by the rather bombastic tone of Geoffrey Clark's far-flung discussion of science, religion, and archaeology. Clark presented his article as a challenge to anti- and pseudoscientific viewpoints—yet his argument utilizes a series of questionable rhetorical tactics more at home in the worst of pseudoscience journals.

In an attempt to draw a "deep" connection between evolution and materialism, Clark makes the bold claim that "one cannot simultaneously understand and accept evolution and its philosophical underpinnings and sustain a belief in the nonmaterial." This is first off a slap in the face to the many religious evolutionary biologists and other scientists who accept evolution and, no doubt, understand it just as well as Mr. Clark. It is also, quite simply, an unprovable opinion that Clark presents as a self-evident truth. I expect more from a magazine which prides itself on careful, substantiated analysis of important issues.

Clark then takes up the position as spokesman for science again by stating "from the standpoint of science, religious beliefs are curious survivors of earlier cognitive evolution." I was actually surprised to hear that 'science' had a viewpoint on something as abstract and ambiguous as 'religion'. Clark seems so intent on supporting his extremist argument concerning the hostile opposition between religion and science that he misrepresents what can be called little more than a consensus among some scientists as an established fact.

I suppose I should mention I am an atheist whose evolutionary ideas and skeptical opinions rest on a firm foundation of materialism. I generally agree with Clark that NAGPRA is an example of faulty legislation which is particularly vulnerable to pseudoscientific claims. I also think that science is a system vastly superior to religion for understanding the world. But Clark's dogmatic claims about evolution, religion, and science distort the real differences that exist between the scientific and religious viewpoints.

Kipp McMichael
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In his otherwise excellent article Geoffrey A. Clark writes of the "materialist biases and assumptions that underlie all of science." It seems to be becoming increasingly fashionable to define science in this way, characterizing it in terms of the content of its explanations: An explanation is scientific only if it is based on "the idea that only matter exists."

While this may be true according to the scientific understanding of today, we do not know that it necessarily must remain true as that understanding progresses in the future. To claim that it must presents science as encumbered by prejudice and as seeking, not the best of all possible explanations, but only the best among those conforming to certain perceptions. Proponents of pseudoscience gleefully seize on such claims and argue that their own a priori assumptions are equally deserving of being called scientific.

The proper way to distinguish science from non-science is not by the concepts (e.g., matter) used in its explanations, but by its adherence to certain principles, such as parsimony, falsifiability, fruitfulness, tentativeness in its theories, completeness, accuracy and precision in its observations, and lack of bias in its practitioners.

John G. Fletcher
Livermore, Calif.

Snuff Film Urban Legend

Scott Stine's otherwise excellent account (May/June 1999) of the background to the urban legend sparked by *Snuff* is marred by an overly sensationalized portrayal of protests against the film. He is not the first to misconstrue or overreact to those protests.

I was arrested in early 1976 for allegedly coming to the assistance of two women who were being beaten by policemen trying to disperse a peaceful picket line against the showing of *Snuff* in Boston. No one was "egged," no "bomb threats" had been reported, and no one, except those two

Scott Stine

women, was "besieged." When the case came to court, the judge ordered that all charges against me and the beaten women be continued without a finding and then dropped.

None of the picketers I had spoken to expressed the belief that a woman had actually been killed in making *Snuff*. Rather, people were concerned that the flaunting of that claim would have a desensitizing effect on the general problem of unprovoked violence against women. Whether it's committed by policemen or others, that problem is indisputably real.

Stine's desire to defuse a dangerous urban legend is appreciated. However, the protesters also had valid concerns. Those concerns were not entirely at odds with his.

Steven Cushing
Jamaica Plains, Mass.

Many thanks to Scott Aaron Stine for showing us that the "snuff film," a particularly abhorrent, sadomasochistic kind of proletarian cinema, is just another "urban legend" and that, as such, it actually has a history. Bravo!

As defined by Stine, the sub-cinematic snuff-genre presents itself as film that "insists that it does contain actual footage of human death and mutilation." Although unstated, but as seems implicit in Stine's argument, this definition of the urban-legendary genre must be further clarified. Such film is presumably edited, i.e., composed to some degree, and that such composition (montage) is driven by a narrational/narrative impulse. So defined, and even though Stine asserts that "no one has actually seen one," I fear I have. And so have you.

All filmed "documentaries" showing real executions are snuff films.

As provided via cable TV, you and I have seen many such on the Arts & Entertainment and History channels (among others). Most commonly, the historical context for these horrific kinetic images is the Third Reich, and typically the perpetrators of those scenes of "human death and mutilation" are Nazi Sonderkommandos operating east of the Elbe and doing their own precocious equivalent of "ethnic cleansing"—an endeavor, as performed by other perpetrators, now being reiterated on CNN (and all other news media). . . .

The "do-it-yourself" kind of snuff-film is exemplified in an egregiously popular videogame called Doom. All of the above, including the historical ("real") film-clips, are now avidly consumed by testosterone-driven American teenagers, especially the now infamous Harris and Klebold.

We are now painfully aware that such brutal images and dark-side pursuits exist everywhere—in video games, on TV, the Net and in Hollywood blockbusters—and they do so because they are popular and, especially, because they are profitable. Do we need to condemn all the above? Is legislation actually called for? If so, then what needs to be outlawed is nearly the entirety of twentieth-century history. But if we were to outlaw history itself, then we would remain ignorant. And then, as history itself shows will happen, it will merely repeat itself.

John F. Moffitt
Las Cruces, N.M.

Other than being punished for a documented crime, there's little to prevent someone from filming a murder. That's probably why snuff films are such an enduring urban legend.

Documentaries of a death do exist. Jack Kevorkian just got convicted for doing one. Also, I believe Timothy Leary appeared on the Internet when he was about to die.

Steve Geller
El Cerrito, Calif.

In the Stine article there is this statement: "(Alfred Hitchcock's *Psycho* [1960] actually bears a much greater resemblance to the case, despite the fact that author Robert Bloch claims he knew nothing of Gein's heinous crimes before writing the novel that inspired the film.)"

Bob Bloch was a close personal friend for thirty-five years. In conversations about *Psycho*, Bob *always* attributed the idea for the novel to Gein.

Les Cole
Ventura, Calif.

An Urban Legend That Isn't

As a regular reader of SKEPTICAL INQUIRER, I have always enjoyed the articles debunking popular myths. However, as I read A. Stine's article, the foreword by Jan Brunvand reminded me that there is sometimes a basis in fact for legends. I read one of Brunvand's books some years back in which he related a story about a man shooting an auto-teller machine as an urban myth that probably reflected our personal frustration with technology. I thought that to be an interesting story except that I have been a police officer for twenty-one years and that incident (which got picked up on the newswires) was my case. It happened in 1981, just before I went into K-9 school, and kept popping up in newsmagazines for a couple of years. The last time I remember reading about it was about three years after the fact in, of all things, a martial arts magazine.

It happened at the now-defunct Freedom Savings in Keene plaza at the corner of Keene Road and East Bay Drive in Largo, Florida. The suspect was a paraplegic man in a wheelchair who was trying to get some money out of the teller machine just after midnight. Unfortunately, he was a little drunk and kept entering the wrong PIN. After three tries, the machine kept his card. Enraged, the suspect took the arm off his wheelchair and beat the machine. He then went back to his van and retrieved a small caliber handgun and shot the machine several times. He then left the scene. Shooting the machine caused the alarm to go off, and I responded. We then called the manager down to the scene and he retrieved the suspect's card. When I tracked the suspect down, he was in bed, still drunk, and thought the entire incident was hilariously funny. I considered trying to handcuff and transport a paraplegic suspect in my cruiser and opted instead to seize the weapon, get a written statement, and set up a non-arrest State Attorney investigation. The suspect was charged with felony criminal mischief and given probation with restitution.

Sometimes (actually in my job—usually) truth really is stranger than fiction . . . or legend.

James S. Holley
Largo Police Dept.
Largo, Fla.

Urban Legends and the Web

As a skeptic and regular debunker of urban legends, I always look for evidence to back up statements people make. Benjamin Radford provides interesting evidence that organ snatching stories are urban legends. However, Radford makes several statements about urban legends without backing them up with evidence.

Specifically, Radford states, ". . . a modern sophistication has developed in which stories of old ladies microwaving their poodles are frequently identified as the tales that they are." Where's the evidence that people are becoming more sophisticated about discerning urban legends? I'd be curious to see the results of a random sample to see how many people believe any number of urban legends. If people are more sophisticated about determining what is true, then there is a contradiction with one of Radford's other statements, "Urban legends are becoming more common in today's society . . ." What evidence is there that urban legends are becoming more common? Has anyone measured the number of urban legends believed now or in the past? "More common" than when? Ten years ago? One hundred years ago? Two thousand years ago?

Radford also states ". . . and the World Wide Web helps spread rumors and legends at an unprecedented rate." My own subjective experiences lead me to believe that rumors and legends are spread more by e-mail (both corporate and Internet, where information is *distributed* to recipients) than the World Wide Web (where people *seek out* information). I take exception especially with this statement because the World Wide

Web has a tremendous ability to *counter* urban legends. Every time I get an e-mail about a free trip to Disney World, a "stolen" cookie recipe, threat of a dreaded e-mail virus, or warning about telephone scams, I refer the sender to one of the Web sites that contains factual evidence that the story is an urban legend.

SI would have done readers a much better service by providing information about urban legend sites (such as Urban Legends Reference Page http://www.snopes.com/ instead of blaming the World Wide Web for spreading rumors.

Richard Rockwell
Montclair, N.J.

Urine Therapy

Martin Gardner's column on urine therapy (May/June) is one of the most bizarre I've read in many years of subscribing to SKEPTICAL INQUIRER. However, he left out one well-documented study of urine as a cure for dehydration.

In *Men Against the Sea*, Charles Nordhoff and James Norman Hall tell how HMS *Bounty* crew members loyal to Captain Bligh were forced to survive for weeks in a small open boat. Without fresh water, several of their number tried drinking their own urine to fight thirst. They all died.

Only one study—true, but convincing results as far as I'm concerned.

I'll pass.

Brad Goldberg
Studio City, Calif.

This is just a small oversight, but in Martin Gardner's article "Urine Therapy" he mentions that urine from pregnant mares is the urea source for the drug Premarin.

While it is true that pregnant mare's urine is the basis of both the name and ingredient in Premarin, that ingredient is not urea. Having no estrogenic properties, what use would urea have in postmenopausal women? The urine is used for its high concentration of estrogenic compounds, primarily estrone and equilin (found as the sodium salts of their sulfate esters). Other substances found in the urine and Premarin are dihydroequilin, estradiol, equilenin, and dihydroequilenin.

Bradley Ambs, R.Ph.
Woodhaven, Mich.

Martin Gardner's column was an excellent summary of the topic but, alas, contained at least one factual error. He stated that Premarin was an urea-containing drug. According to the manufacturer (PDR 1988) Premarin contains no urea. It is used as an estrogen replacement in post-menopausal women. I've prescribed it many times to my patients. It is manufactured from pregnant mare's urine because pregnant mares are prodigious producers of natural estrogens which get concentrated in the urine.

Also urine has been shown to contain various acid hydrolases (lysozymes) which have anti-bacterial activity. Therefore, there could be some scientific basis for making some kind of anti-bacterial salve out of urine to apply to injuries to prevent infection. Is urinating on a wound as effective as applying and antibiotic ointment? Who knows? I'm sure it's never been scientifically studied but it might work in a pinch.

Charles Goodman, M.D.
Saratoga, Calif.

Unmasking the Goddess

I can't tell you how pleased I was to discover in SKEPTICAL INQUIRER (May/June), the review of P. Davis's *Goddess Unmasked*. I have definite plans to purchase two or more copies of the book as an intellectual balm for victims of this annoying movement.

Aaron Goodell
Manhattan Beach, Calif.

It's a sad commentary that we've been subjected to so much hype and disinformation because reputable authorities declined to criticize supposed histories and anthropologies of the "goddess" because they didn't want to appear "anti-feminist." It should be a mark of honor to stand up to brainless neurotic troublemakers and intellectual vandals.

David C. Morrow
Corpus Christi, Texas

Pickover Responds on Cryptozoology

Re: Ronald Pine's letter (July/August 1999, p. 78) on my recent News & Comment article (March/April):

As I noted in my article, many define the term "cryptozoology" as the study of newly discovered and rediscovered organisms, and hypothetical creatures thought to exist based on the biological clues they leave behind. Perhaps Dr. Pine is suggesting that this term not be defined in this manner, but, in any case, I am glad that he reiterates my examples of wonderful discoveries of authentic cryptozooic animals such as the Vu Quang ox and okapi. I agree with what Dr. Pine says, and I'm sure we both share a sense of awe at the remarkable panoply of creatures, discovered and undiscovered, with whom we share the planet.

Clifford A. Pickover
Yorktown Heights, N.Y.

That's Extraordinary?

I wonder whether we are doing our skeptical point of view a service by continuing to state that "extraordinary claims require extraordinary proof."

This statement can easily be interpreted as our requiring more stringent proof for unusual claims than we require in mainstream science. Thus, we can be perceived as behaving unfairly.

It might be more palatable to maintain that "extraordinary claims require at least some evidence that is credible and reliable." Since most unusual claims include no good evidence at all, demand for extraordinary evidence appears unnecessary.

Oran B. Dent
Centerville, Ohio

The letters column is a forum for views on matters raised in previous issues. Letters should be no more than 225 words. Due to the volume of letters not all can be published. Address letters to Letters to the Editor, SKEPTICAL INQUIRER. Send by mail (preferred) to 944 Deer Dr. NE, Albuquerque, NM 87122; by fax to 505-828-2080; or by e-mail to letters@csicop.org (include name and address).

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PENNSYLVANIA. Paranormal Investigating Committee of Pittsburgh (PICP), Richard Busch, Chairman, 8209 Thompson Run Rd., Pittsburgh, PA 15237 (412-366-1000), E-mail: mindful@telerama.com. **Philadelphia Association for Critical Thinking** (PhACT), Eric Krieg, P.O. Box 1131, North Wales, PA 19454-0131, Web: http://www.phact.org, Tel: (215) 885-2089.

TENNESSEE. Reality Fellowship, Contact: Carl Ledendecker, 2123 Stonybrook Rd., Louisville, TN 37777.

TEXAS. Houston Association for Scientific Thinking (HAST), Darrell Kachilla, P.O. Box 541314, Houston, TX 77254. **North Texas Skeptics,** Joe Voelkering, President, P.O. Box 111794, Carrollton, TX 75011-1794.

WASHINGTON. The Society for Sensible Explanations, P.O. Box 45792, Seattle, WA 98145-0792. Tad Cook, Secretary. E-mail: tad@ssc.com.

WISCONSIN. Contact: Mike Neumann, 1835 N. 57th Street, Milwaukee, WI 53208 (414-453-7425, E-mail: mike@omnifest.uwm.edu).

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The organizations listed above have aims similar to those of CSICOP but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSICOP. Please send updates to Barry Karr, P.O. Box 703, Amherst, NY 14226-0703.

George Agogino, Dept. of Anthropology, Eastern New Mexico University

Bill G. Aldridge, executive director, National Science Teachers Assoc.

Gary Bauslaugh, educational consultant, Center for Curriculum, Transfer and Technology, Victoria, B.C., Canada

Richard E. Berendzen, astronomer, Washington, D.C.

Martin Bridgstock, lecturer, School of Science, Griffith University, Brisbane, Australia

Richard Busch, magician, Pittsburgh, Pa.

Shawn Carlson, physicist, San Diego, Calif.

Charles J. Cazeau, geologist, Deary, Idaho

Roger B. Culver, professor of astronomy, Colorado State Univ.

Felix Ares de Blas, professor of computer science, University of Basque, San Sebastian, Spain

Michael R. Dennett, writer, investigator, Federal Way, Washington

Sid Deutsch, consultant, Sarasota, Fla.

J. Dommanget, astronomer, Royale Observatory, Brussels, Belgium

Nahum J. Duker, assistant professor of pathology, Temple University

Barbara Eisenstadt, psychologist, educator, clinician, East Greenbush, N.Y.

John F. Fischer, forensic analyst, Orlando, Fla.

Robert E. Funk, anthropologist, New York State Museum & Science Service

Eileen Gambrill, professor of social welfare, University of California at Berkeley

Sylvio Garattini, director, Mario Negri Pharmacology Institute, Milan, Italy

Laurie Godfrey, anthropologist, University of Massachusetts

Gerald Goldin, mathematician, Rutgers University, New Jersey

Donald Goldsmith, astronomer; president, Interstellar Media

Clyde F. Herreid, professor of biology, SUNY, Buffalo

Terence M. Hines, professor of psychology, Pace University, Pleasantville, N.Y.

Michael Hutchinson, author; SKEPTICAL INQUIRER representative, Europe

Philip A. Ianna, assoc. professor of astronomy, Univ. of Virginia

William Jarvis, professor of health promotion and public health, Loma Linda University, School of Public Health

I. W. Kelly, professor of psychology, University of Saskatchewan

Richard H. Lange, M.D., Mohawk Valley Physician Health Plan, Schenectady, N.Y.

Gerald A. Larue, professor of biblical history and archaeology, University of So. California.

Bernard J. Leikind, staff scientist, GA Technologies Inc., San Diego

William M. London, consumer advocate, Fort Lee, New Jersey

Thomas R. McDonough, lecturer in engineering, Caltech, and SETI Coordinator of the Planetary Society

James E. McGaha, Major, USAF; pilot

Joel A. Moskowitz, director of medical psychiatry, Calabasas Mental Health Services, Los Angeles.

Jan Willem Nienhuys, mathematician, Univ. of Eindhoven, the Netherlands

John W. Patterson, professor of materials science and engineering, Iowa State University

Steven Pinker, professor and director of the Center for Cognitive Neuroscience, MIT

James Pomerantz, Provost, and professor of cognitive and linguistic sciences, Brown Univ.

Gary P. Posner, M.D., Tampa, Fla.

Daisie Radner, professor of philosophy, SUNY, Buffalo

Michael Radner, professor of philosophy, McMaster University, Hamilton, Ontario, Canada

Robert H. Romer, professor of physics, Amherst College

Milton A. Rothman, physicist, Philadelphia, Pa.

Karl Sabbagh, journalist, Richmond, Surrey, England

Robert J. Samp, assistant professor of education and medicine, University of Wisconsin-Madison

Amardeo Sarma,* project supervisor, EURESCOM; executive director, GWUP, Germany

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Béla Scheiber,* systems analyst, Boulder, Colo.

Chris Scott, statistician, London, England

Stuart D. Scott, Jr., associate professor of anthropology, SUNY, Buffalo

Erwin M. Segal, professor of psychology, SUNY, Buffalo

Carla Selby, anthropologist/archaeologist

Steven N. Shore, associate professor and chair, Dept. of Physics and Astronomy, Indiana Univ. South Bend

Barry Singer, psychologist, Eugene, Oregon

Waclaw Szybalski, professor, McArdle Laboratory, University of Wisconsin-Madison

Ernest H. Taves, psychoanalyst, Cambridge, Massachusetts

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Neil deGrasse Tyson, astrophysicist, Princeton University and the Hayden Planetarium

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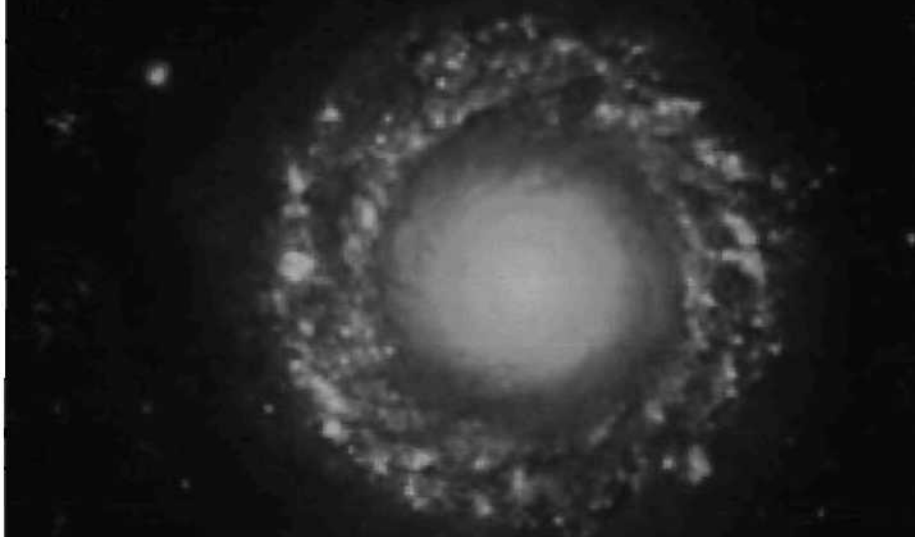

What may first appear as a sunny-side-up egg is actually NASA Hubble Space Telescope's face-on snapshot of the small spiral galaxy NGC 7742. But NGC 7742 is not a run-of-the-mill spiral galaxy. In fact, this spiral is known to be a Seyfert 2 active galaxy, a type of galaxy that is probably powered by a black hole residing in its core. The core of NGC 7742 is the large yellow "yolk" in the center of the image. The lumpy, thick ring around this core is an area of active starbirth. The ring is about 3,000 light-years from the core. Tightly wound spiral arms also are faintly visible. Surrounding the inner ring is a wispy band of material, which is probably the remains of a once very active stellar breeding ground.

Photo Credit: Hubble Heritage Team

THE COMMITTEE FOR THE SCIENTIFIC INVESTIGATION OF CLAIMS OF THE PARANORMAL

The Committee for the Scientific Investigation of Claims of the Paranormal encourages the critical investigation of paranormal and fringe-science claims from a responsible, scientific point of view and disseminates factual information about the results of such inquiries to the scientific community, the media, and the public. It also promotes science and scientific inquiry, critical thinking, science education, and the use of reason in examining important issues. To carry out these objectives the Committee:

- Sponsors publications
- Conducts public outreach efforts
- Maintains an international network of people and groups interested in critically examining paranormal, fringe-science, and other claims, and in contributing to consumer education
- Encourages research by objective and impartial inquiry in areas where it is needed
- Convenes conferences and meetings
- Conducts educational programs at all age levels
- Does not reject claims on a priori grounds, antecedent to inquiry, but examines them objectively and carefully

The Committee is a nonprofit scientific and educational organization.
The Skeptical Inquirer is its official journal.

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